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Southern Flight

The Complete Monthly Digest of Aeronautics in The South and Southwest

MAY, 1937 VOL. VII No. 5

Contents:

Special Features

POWER PLANT TRENDS—PART I., By George J. Mead 6
SIDELIGHTS ON AIRCRAFT SALES, By Jack Gaty 11
WHITHER, LIGHTER-THAN-AIR? BY Creighton I. Merrell 14
LOUISIANA GOES TOURING, By Larry J. Fisher 18

Regular Features

JUST AMONG OURSELVES—Editorial Comment 4
NEW EQUIPMENT
Allison 1000 h. p. Inline Engine 16
Continental 1937 Engines with Fuel Injection 17
NEWS OF THE MONTH IN REVIEW 20
PORTS OF CALL 23
CLASSIFIED ADVERTISING 33

The Cover:

Two views of the cleanly designed, Menasco C-4 powered Aeroneer, now undergoing A. T. C. tests in Los Angeles. Seating two people side-by-side, the all metal monoplane cruises at 138 miles per hour at 8,000 feet, using 75% of its rated 125 horsepower. Gasoline consumption is at the rate of 7.8 gallons per hour. Useful load is 734 pounds.

A two-place, tandem seating, military primary trainer and a single seater, all-purpose, military model using the same basic design are under development by the manufacturers, Aero Engineering Corporation. A 160 h. p. Menasco and a radial engine of similar horsepower will be installed for future test work.

★ ★ ★ ★ ★ Just Among Ourselves ★ ★ ★ ★ ★

Rebate

THE value of strong, centralized organization for every phase of the industry is admirably demonstrated in the new neutrality law recently signed by the President. It exemplifies, too, the fact that the "little fellow" is not always forgotten in the various campaigns for equitable treatment.

One of the most important items in the new law is that relating to the registration fee. The old law forced all manufacturers, whether exporting or not, to pay a registration fee of $500. This was a real hardship in the case of the small company; and the Aeronautical Chamber of Commerce made representations to the Secretary of State and the Munitions Control Board in an effort to have this provision changed. As a result, the fee has been reduced from $500 to $100 in all cases where the export business for the preceding 12 months does not exceed $50,000. Companies that have paid the $500 are now entitled to a $400 refund if they can qualify under the above terms.

The industry can expect future consideration from the law makers if we can strengthen our forces by unified action and fight together under the banner of one potent organization. The smaller companies are an important part of the picture and owe the Aeronautical Chamber unqualified support.

Ohio Valley Or Guernica

WORLD events of the past few months bear strong witness to the airplane's increasing versatility. John Citizen is beginnnig to realize that the modern airplane is one of the most powerful tools ever to be placed in the hands of man. Ironical it is then that in this enlightened day we observe the airplane not only as an indispensable agent of mercy but as a hideous killer.

Contrast the scene of the Ohio Valley flood and the recent slaughter at Guernica, Spain. When a twist of nature made the Ohio Valley a seething torrent, airplanes by the hundreds were enlisted for service to suffering humanity, dispatching duties beyond the pale of other mobile means. But at Guernica, where bombs and machine gun bullets from the air blasted into the bodies of 800 Basque men, women and children, bitterness and hatred were at the controls in an effective, death-dealing barrage.

Here in the United States we have given due emphasis to the crying need for adequate air defense and the situation is being corrected with new appropriations, though far below the actual requirements.

Let us strongly hope that the utility of the airplane in national emergencies and in the service of humanity, so impressively demonstrated in the Ohio Valley, will be recognized by Congress and the government agencies to the end that civil aeronautics will be encouraged and fostered rather than regarded with apathy and hampered with over-regulation.

Whispering Campaigns

HARDLY a manufacturer of aircraft in the United States has ever been free from periodic "whispering campaigns" against his product. A great many of our aircraft salesmen still suffer from the belief that they can sell their wares by running down the other fellow's. Until this cancerous element is eliminated from the business, public confidence will be slow and the entire industry will continue to suffer the damage in actual cash.

Our worthy contemporary, *Canadian Aviation*, sternly faces the issue in these succinct statements which bear repeating here:

"Whispering campaigns are slimy things at the best of times, and the flying game may congratulate itself that it has been so comparatively free from them. It makes it all the more painful to have to refer to an example

(Continued on Page 34)

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Powerplant Trends

Part One

GEORGE J. MEAD
Vice-President and Chief Engineer
United Aircraft Corporation

TRANSPORT aviation is expanding in America both because of improved business conditions and the excellent record of the transport companies. The new airplanes being laid down, both land transports and boats, are, on the average, twice the size of their immediate predecessors measured in terms of gross weight. Never before in the history of our industry has there been such a large increase in size in such a short period. See Fig. 1. Coupled with the demand for larger airplanes is the requirement for decidedly higher cruising speeds. To meet these demands the total thrust horsepower per airplane is being materially increased. Operating costs are becoming more and more important due to the competition among air lines, as well as between them and other forms of transportation. The engineer is consequently forced to give serious consideration to utilizing the power available in the most efficient manner, as well as to reducing maintenance costs. The maximum dependability is also demanded, both to insure safety as well as to maintain the predetermined schedules. The new airplanes are, therefore, designed to give efficient performance at take-off and under cruising conditions rather than, as heretofore, at their top speeds. This practice provides for carrying the revenue-producing load at the minimum cost per ton-mile.

With the trend toward larger airplanes and higher speeds, the question naturally arises as to whether the engine development can keep pace with the requirements. It is my object, therefore, to forecast the probable development of the orthodox type of four-stroke internal-combustion engine using gasoline. To do this, it is desirable, first, to examine the trend of the last decade as being the best indication we now have of probable future developments. The output per liter has risen steadily from 18 to 35 hp., as shown on Fig. 2, and the crank speeds have increased from 1900 to 2800 rpm., or roughly 50%. During the same period the take-off mean effective pressure has been increased from 132 lb. to nearly 200 lb. and the cruising pressures from 90 to 135 lb., while the operating periods between overhauls have increased from 300 to 600 hours. Can this rate of progress be expected in the future, or may it be improved? Research authorities on both sides of the ocean have already reported outputs of 100 hp. per liter. To be sure, these experimental engines would hardly measure up to the requirements of commercial operation and, besides, they require special fuels. Nevertheless, this gives an objective to be ultimately attained by our standard engines. It is interesting to note, in this connection, that we are fast approaching the goal of 40 hp. per liter set up by Mr. Fedden in his paper[1] before the Society in December, 1933.

Editor's Note: **This exhaustive, informative treatise was presented before the Royal Aeronautical Society Meeting in London on April 22 and delivered at the Summer Meeting of the Society of Automotive Engineers at White Sulphur Springs on May 4. It is published herewith by courtesy of the Royal Aeronautical Society.**

The new airplanes now being built require take-off powers of 1100 to 1200 hp. and continuous cruising powers of 650 to 750 hp.; fuel consumptions of .42 to .44 lb./hp.-hr. are being guaranteed. The engines are geared and supercharged and weigh with this equipment, ready to run, from 1.2 to 1.3 lb. per take-off horsepower. The Vee-type 12-cylinder liquid-cooled engine, although standard elsewhere, is very little used in transport service in the United States.

IMPROVEMENT OF EXISTING TYPES

The need for greater power naturally directs attention

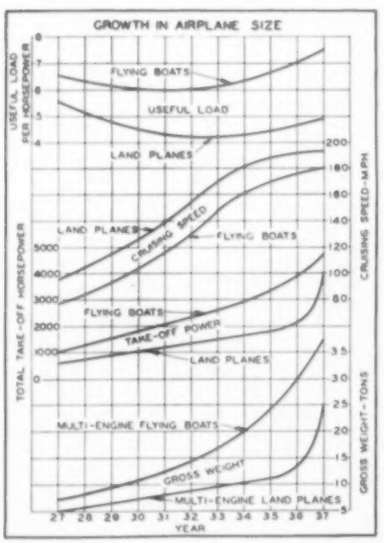


FIG. 1.

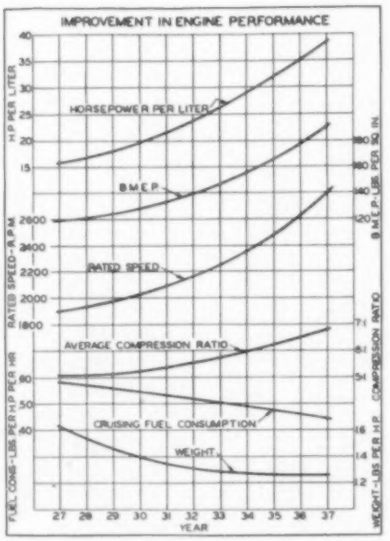


FIG. 2.

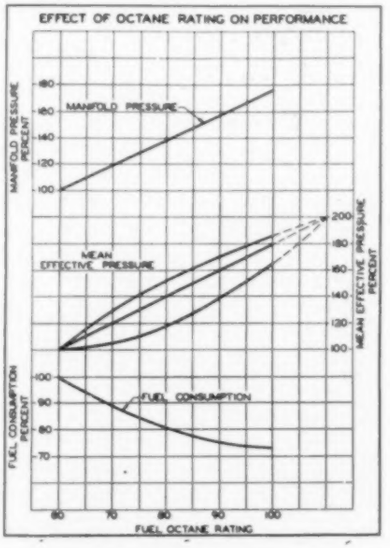


FIG. 3.

1 A. H. R. Fedden—"Possible Future Developments of Air-Cooled Aero Engines." The Journal of the Royal Aeronautical Society, March, 1934.
2 D. P. Barnard—"The Value of Octane Numbers in Flight." Lecture before the Society of Automotive Engineers, March 12, 1937.
P. B. Taylor—"Increasing the Thrust Horsepower from Radial Air-Cooled Engines." S. A. E. Journal, April, 1931.
C. B. Veal—"Rating Aviation Fuels in Full-Scale Aircraft Engines." S. A. E. Journal, May, 1936.

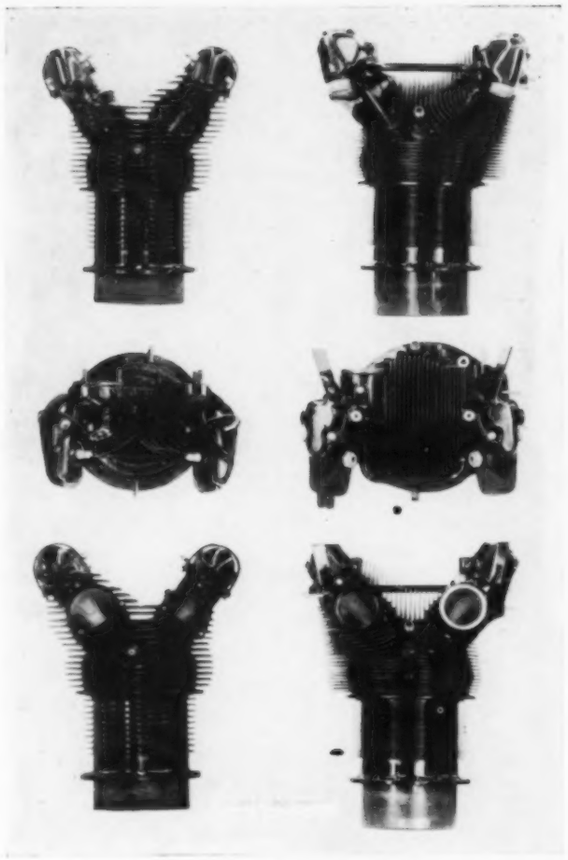


FIG. 4. Comparison of Cooling Fins

first to the opportunities for improving the performance of the present standard types. Such improvement may be provided through the use of fuels with higher knock rating, additional displacement, better cooling, greater boost, higher operating speeds, and lower fuel consumptions.

Fuels

The improvement in fuels has without doubt been the greatest single aid in bettering engine performance during the past ten years. The general effect of this on output is shown on Fig. 3. Unfortunately, authorities are not yet in agreement as to the precise effect of better fuels on engine performance. For this reason three curves[2] are given and it is to be presumed that the final evaluation is likely to be a mean of these extremes, especially as all three curves pass through the same end-points. Despite the increase in cost, our air lines have pretty generally standardized on 87-octane. Actual experience has shown that the better grades of gasoline not only give superior performance, but reduce the maintenance cost to such an extent as to more than justify the higher fuel cost. During the latter part of 1936 several of our transcontinental lines commenced using 100-octane fuel for take-off because of the much greater payloads that could thus be carried.

Several excellent papers have been published recently both in England and in the United States analyzing the return in money value from the use of higher-octane fuels and the general adoption of 100-octane can be safely predicted.[3]

Fuel experts seem generally of the opinion that further fuel development is entirely possible, but are far from unanimous on the probable course that this development will take. Most of the more common petroleum derivatives have already been investigated and exploration of the less familiar hydrocarbon groups is under way. At the same time a new measuring stick is needed, as the octane scale ends at 100. A different system for the measurement of the knock rating is also required, since the bouncing-pin system has been found wanting in the case of the higher octane ratings. Another method has been devised by the U. S. Army Air Corps in which temperatures are substituted for pressures. This apparently gives satisfactory results, at least to the end of the octane scale. Fuels of antiknock value well above 100-octane rating have been produced for laboratory experimental tests. Despite the importance of continuing the development of fuels with higher antiknock ratings, there appears to be another line of attack, as special fuels have been produced for racing engines of approximately 300 lb. mep. and for experimental cylinders of over 500 lb. mep. which did not have particularly high octane ratings. Undoubtedly the cost of these fuels is at present prohibitive, but it seems probable that the cost might be reduced or else some other fuels developed which will give equally satisfactory results at commercial prices.

Displacement

The trend in the development of existing types is toward the use of smaller cylinders and higher operating speeds. Maximum performance is actually being secured with the total displacement reduced from 10 to 15% in the latest examples of nine-cylinder radial and twelve-cylinder Vee engines. The smaller cylinders also permit the reduction of engine diameter or cross-section.

The exception to the general trend is the two-row radial. Here it may be feasible to use eighteen instead of fourteen cylinders, providing a satisfactory built-up crankshaft can be developed. This would provide an increase in displacement of 25% and correspondingly greater power. The diameter of such a combination will only be slightly greater than the fourteen-cylinder type with the same size of cylinders.

Cooling

The maintenance of permissible operating temperatures of the parts exposed to the combustion space is one of the most serious problems of the designer today, for these temperatures determine the detonating characteristics of a cylinder on a given fuel and thus influence the rating of the engine. The usual effect of continuous detonation is cracked or scored pistons or cylinders and is therefore to be avoided.

To gain a better idea of the cooling problems involved, I propose first to review the progress to date before at-

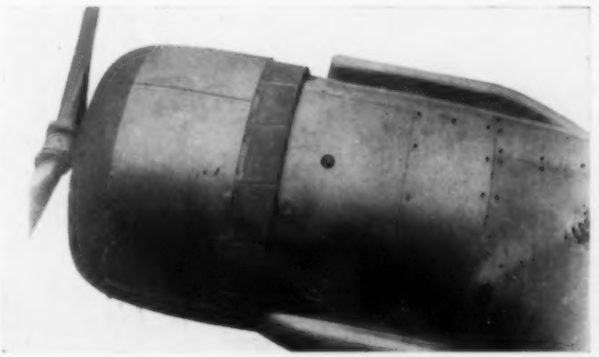


FIG. 5. Engine Cowl Flaps

[3] F. R. Banks—"Ethyl." The Journal of the Royal Aeronautical Society, April, 1934.
"Fuels and Modern Aero Motor Design." Lecture before the Royal Aeronautical Society, January 8, 1937.
E. L. Bass—"High Octane Fuels." Aircraft Engineering, January, 1937.
E. L. Bass and S. A. W. Thomson—"Influence of Fuel Properties on Air Line Operating Costs." Shell Aviation News, December, 1936.
F. D. Klein—"Aircraft Engine Performance with 100-Octane Fuel." Journal of the Aeronautical Sciences, March, 1935.
"Future Possibilities of 100-Octane Aircraft-Engine Fuel." S. A. E. Journal, August, 1936.
D. P. Barnard—Loc. cit. supra.

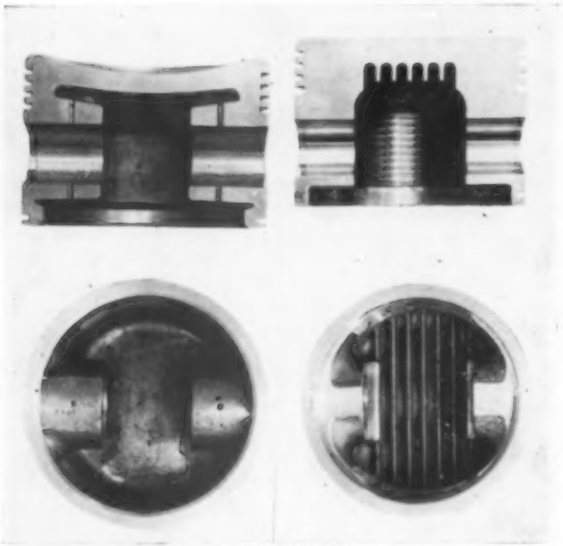


FIG. 6. Piston Evolution

tempting to discuss possible improvements. The cooling of the exterior of the combustion chamber is accomplished by the slipstream, either directly for the air-cooled or indirectly for the liquid-cooled engine. The direct method has much to recommend it and to date has been the simpler and lighter system. As a matter of fact, its weight saving brought it into universal transport use in the United States. The original wide fin spacing with relatively small fin area, as shown in Fig. 4, was sufficient for outputs of 18 hp. per liter, while the drag of the uncowled engine compared favorably with that of the water-cooled engine and nose radiator. The development of the low-drag cowl made the drag of the air-cooled engine comparable to that of the high-temperature liquid-cooled engine and external tunnel radiator. As power increased, corresponding additions were made in radiation surface, by reducing the pitch of the fins and increasing their length. The latest improvement has been to direct and control the cooling-air flow by means of close or pressure baffles around the cylinders and adjustable trailing-edge flaps on the cowl, as shown on Fig. 5. This gradual evolution of the direct system has so far kept pace with the demand. However, it is no longer feasible to increase the fin area materially, so that further improvement must come from increasing the mass flow of air over the cylinders. There is every indication that blower cooling, as this might be termed, will permit carrying the power of air-cooled engines considerably higher.

Fundamentally, heat dissipation may be improved by increasing the mass flow of either the air or liquid over the combustion chamber. For maximum output and minimum consumption, it is essential to maintain uniform temperatures over all of the combustion chamber and that portion of the cylinder traversed by the piston. As it is perhaps easier to do this with liquid than with air, this may be a deciding factor. The air-cooled cylinder has the advantage of greater temperature difference between cooling air and cylinder, but correspondingly profits less from the reduced atmospheric temperature at altitude. Further improvement in liquid cooling centers on the elimination of thermal stresses in the cylinders and on better provision for heat transfer from the exterior surface of the combustion chamber to the cooling medium. A great deal can be accomplished along these lines by applying the lessons already learned from air-cooling.

Only approximately 50% of the combustion chamber can be cooled by the cooling medium flowing over it. The accompanying table shows a percentage analysis of a 5½" x 5½" cylinder with both two and four poppet valves and with a sleeve valve. A compression ratio of 7:1 is assumed, and two 18-mm. spark plugs.

DISTRIBUTION OF INTERIOR COMBUSTION CHAMBER AREA
(5½" x 5½" Cylinder)

	Two Spherical Head	Four Valves Roof Head	Sleeve Valve
Piston	44.0	40.5	35.5
Valves	13.3	11.8	25.8*
Plugs	1.3	1.2	1.1
Balance of Combustion Chamber	41.4	46.5	37.6
Total	100.0%	100.0%	100.0%
Total of heat-exposed area	100%	100%	100%

*Exposed portion of sleeve with piston at top center.

As will be seen from this table, the piston head is the largest area in the combustion chamber which is not cooled by the slipstream. A large part of its heat dissipation is through the piston rings to the cylinder barrel. For this reason, the number of rings has increased as power and temperature have been raised. The balance of the piston cooling is accomplished principally by oil thrown off the cranks. Fins were first added to the underside of the piston heads and then to the piston skirts to improve this cooling, as shown on Fig. 6. It is this heat flow to the lubricating oil which accounts for the steady increase in size of oil coolers.

The valves also account for a considerable portion of the combustion chamber area. Since the inlet valves are cooled by the incoming mixture, the uncooled valve area is approximately one-half that shown in the table. The introduction of the hollow chemically-cooled exhaust valve has been the greatest single improvement in valve cooling. Originally only the stem was cooled, but now a forging technique has been developed which permits making the entire valve head hollow. This is illustrated in the evolution of our exhaust valves as shown on Fig. 7.

The problem of spark-plug cooling is becoming serious and is made more so by the necessity for using shielding for proper radio communication. Some improvement has been obtained by reducing the plug size. The length of the threaded portion of the plug in the cylinder has been increased along with the reduction in diameter. This has definitely reduced the plug temperatures and a still further improvement has been made by locating the electrodes in a pocket rather than in the combustion chamber itself. There is the further difficulty that plugs

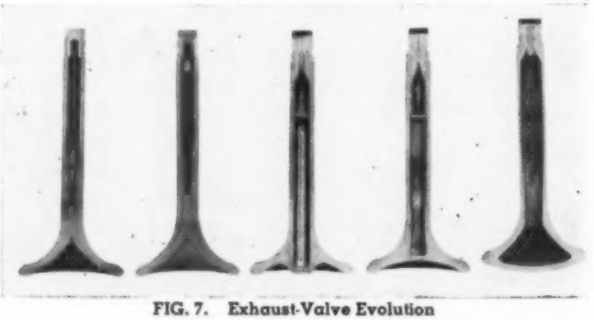


FIG. 7. Exhaust-Valve Evolution

which operate satisfactorily at high output are likely to foul with oil when idling. All in all, we appear to be fast reaching a limit and a more positive means must soon be provided to cool the spark plug.

Superchargers

Superchargers, when fiast introduced, were used solely to restore sea-level power at altitude, as the fuels then available would permit little or no ground boost. Pressure supercharging has now become necessary to increase take-off power, as well as for altitude operation. The present commercial practice is to use an engine-driven centrifugal supercharger placed between the carburetor and the cylinders. This location has been dictated principally through considerations of mixture distribution in the radial type engine, although it has the additional advantages of compactness and simplicity of drive. With such a system the use of an intercooler is practically prohibited. The amount of boost is limited, in the absence of an intercooler, by the temperature of the mixture, which is, in turn, a function of the peripheral speed of the impeller. Two-speed drives have been employed to reduce the impeller tip speed near the ground where the air temperature is higher. Unfortunately, in this type the improvement in performance at the lowest and highest altitudes is more than offset by the reduction in performance at the intermediate altitudes where most commercial operations are carried out, and in particular where excess emergency and take-off powers are required. Figure 8 illustrates the normal and available powers of engines equipped with single-stage superchargers with both single- and two-speed impeller drives. Cruising powers are, of course, available to much higher altitudes than those shown for normal powers, but here again the two-speed arrangement is somewhat at a disadvantage, as the fuel consumptions are greater at those altitudes where it is necessary to use the higher gear ratio.

There is little hope of further improvement in single-stage supercharging without the use of an intercooler. The practical way to employ one on a radial engine with carburetor is to use a two-stage supercharger and place the intercooler between the stages. Such a system provides for the decided increase in boost which will be required if transport operations are to be carried to materially higher altitudes. Where the supercharger is not required for distribution, as in some types of inline engines, the cooler may be placed between the supercharger and the carburetor by locating the supercharger ahead of the carburetor.

The ideal system for any engine type would be one in which the amount of supercharging could be regulated to fit each operating condition and altitude. This requires that an infinite number of impeller speeds be available for a fixed impeller and diffuser combination. Furthermore, it should be possible to use an intercooler without interfering with distribution. The exhaust-driven turbo supercharger, when used with suitable distribution or direct fuel injection, essentially meets these requirements and may, therefore, become attractive for commercial use. It has the added advantage of reducing exhaust noise.

High-altitude transport operation will require the use of either an engine-driven two-stage or an exhaust-driven turbine. Consequently, a comparison of these two systems is of interest. Comparative curves are given on Fig. 8, assuming cruising operation at 25,000 feet. Both arrangements provide surplus power for take-off and emergency use beyond that which can be safely utilized in continuous service. Little or no experience has been had with either system in commercial operation as yet, so that it is difficult to evaluate the eventual trend. Generally speaking, the turbine may be preferred because of its flexibility and absence of restriction on the critical altitude.

Speed of Operation

Operating speed is limited both by the valve gear and by the crankpin loading. Continued refinement of the poppet valve mechanism has thus far enabled it to keep pace with the requirements. One of our two-row engines with 5½" bore is rated at 2700 rpm. for take-off, which is illustrative of what may be accomplished with two valves per cylinder when operated by push rods. The type of gear in which the cams operate directly on the valves is the best for maximum speed. It is, however, more applicable to the in-line engine than to the radial. On the whole, there seems little opportunity of much further increase in poppet-valve speeds for a given valve size.

The connecting-rod bearing loads, especially in the radial type of engine, are becoming a limiting factor. These increase directly as the mass of the rotating portion of the connecting-rod system and as the square of the speed. Practically no reduction in loading can be made by increasing the bearing areas beyond a certain point, as the added rod weight nullifies the possible gain. Further improvement must be made, therefore, by reducing the weight of the connecting-rod system and

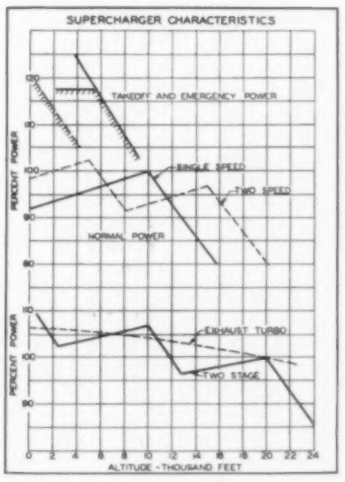


FIG. 8.

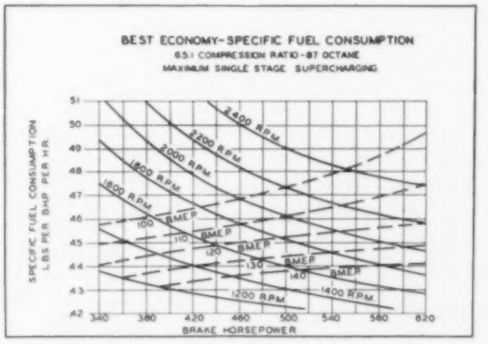


FIG. 9.

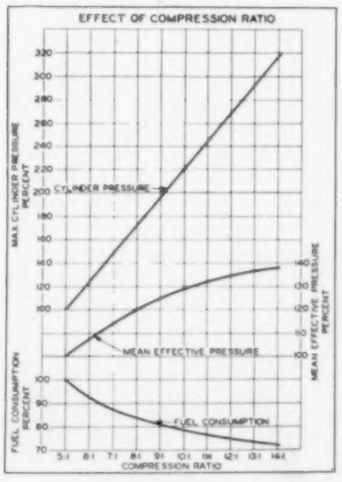


FIG. 10.

through better types of bearings and bearing alloys.

Specific Fuel Consumption

Specific fuel consumptions of .46 lb./bhp.-hr. are being maintained by our single-row engines in transcontinental service. These engines are being operated at an average of 75% of rated power, with 80-octane fuel and 6:1 compression ratio. The two-rows on the transpacific run are averaging .44 at a somewhat lower percentage of their rated power with 87-octane fuel and 6.5 compression ratios. Both the transcontinental and transpacific engines are equipped with automatic mixture controls. As far as I am aware, these figures are as good as have yet been achieved in transport service with either air- or liquid-cooled engines.

Continuous operation at the minimum consumption involves serious cooling problems for the engine designer. Exhaust-valve, spark-plug, and piston-head temperatures become critical under these conditions and piston erosion is likely to be encountered. It is for this reason that the extremely low specific consumptions which can be demonstrated on the dynamometer are not yet necessarily feasible in commercial operation. The cooling problem now is actually more acute at cruising powers with low fuel consumption than at take-off or in climb.

As is well known, figures on specific consumption obtained in flight are subject to considerable error. This is primarily due to the lack of accurate information on the power being developed. It has been customary to estimate the power from the manifold pressures; this is unfortunately an uncertain method. The need for an accurate method led to the development by Pratt & Whitney of their new torque meter. In principle, this consists of an hydraulic means of measuring the torque reaction on the fixed gear of the propeller reduction. With this device, power readings are precise within 1%.

The most promising methods of obtaining lower fuel consumptions are through refinement in combustion chamber design and the use of higher compression ratios. The research in connection with measuring the knock valve of fuels has shown the decided effect of combustion chamber form and construction on both the detonating and fuel consumption characteristics of a cylinder. Turbulence and spark plug position, as well as uniform distribution, are undoubtedly other factors influencing minimum consumption.

Compression Ratio

The improvement in performance due to higher compression ratios is shown by Fig. 10. The progress in this direction has been slow because of the detonating limitations of fuels and the destructive effects of the accompanying higher explosion pressures. Ratios at least up to 9:1 afford material reductions in consumption, after which the improvement commences to taper off. In the United States, ratios of 6½ to 7 are now standard for 87-octane fuel. Presumably, the use of 100-octane will ultimately permit the use of ratios of 7½ to 8 with a corresponding reduction in fuel consumption. The sleeve valve may eventually be capable of even lower consumptions, as it is generally conceded that it enables the use of one integer of compression ratio higher than can be used by a poppet valve operating on the same fuel. An incidental advantage of the higher ratios is the improvement in power of approximately 5% for each added integer of compression ratio. However, if increased power alone were required, it would be better to secure it with boost, since the maximum pressure would be lower.

Distribution

The equal distribution of the charge to the various cylinders has a definite bearing on fuel consumption, as the leanest cylinder limits the performance of the entire engine. Supercharging has generally improved distribution because of its effect on the temperature of the charge, while in the radial engine there has been a further improvement due to the symmetrical nature of the intake system, which is centered on the impeller. This no doubt partly accounts for the excellent consumptions referred to in connection with our radial engines. Direct fuel injection holds promise of a possible further improvement in this direction.

Minimum fuel consumption cannot be maintained in service by manual adjustment of the mixture-control, due to the need for frequent resetting, and because it is as yet impossible to determine accurately the engine-operation conditions. The exhaust-gas analyzer is not, therefore, a particularly helpful solution for the commercial pilot, since it still leaves the actual setting of the mixture controls to him. To meet this requirement Pratt & Whitney have developed an automatic mixture control,[4] and indications are that similar equipment will be required on all future engines where continuous economical operation is desired.

The use of the constant-speed propeller makes possible the operation of the engine at the most advantageous combination of speed and mean effective pressure for minimum fuel consumption. We have found that the best results are obtained by keeping the mean effective pressure reasonably high and lowering the speed, since this in effect improves the mechanical efficiency. This condition is illustrated graphically by Fig. 9.

Sleeve Valve

Mention should be made of the single-sleeve valve as a possible improvement of existing types. Its principal advantage lies in reducing the maximum combustion-chamber temperature through elimination of the exhaust valve. As already mentioned, this permits the use of approximately one integer more of compression ratio with a given fuel, which results in improving the output and the fuel consumption as shown by Fig. 11. It is doubtful whether the sleeve valve gives materially better volumetric efficiency than can be obtained with poppet valves, due to the limitations of sleeve travel and the flow characteristics of the ports. It has, however, another important advantage, namely, its ability to operate at higher speeds due to the positive motion of the sleeve. This feature will become particularly important whenever engine operating speeds exceed the capabilities of the spring-returned poppet valve now in general use.

The development of the single-sleeve valve has been relatively slow, due primarily, I believe, to the difficulty in fabricating suitable interchangeable sleeves. Thanks to the encouragement of your Air Ministry and the splendid work of Mr. Ricardo and Mr. Fedden, there is now widespread interest in the single-sleeve valve. It is a foregone conclusion that this will greatly accelerate its development and the final evaluation of its merits.

The trend of development of the present standard engines is definitely toward somewhat smaller cylinders operating at higher speeds with greater boost. The results of such development will be smaller, more compact engines which will provide greater thrust power in relation to their form drag. Improved smoothness of operation will be achieved by the use of lighter reciprocating parts and higher crank speeds. These new powerplants will not only insure higher airplane performance but also longer life and lower operating cost. Continuous cruising powers of 700 to 1200 hp. will no doubt soon be available from our present engine types, with take-off powers at least 35% in excess of these.

(Next month: "Future Requirements.")

Sidelights on Aircraft Sales

Marketing problems of the private owner field are akin to those experienced by the automotive industry in the early day and require a cooperative program on the part of all manufacturers.

JACK GATY
Sales Manager
Beech Aircraft Corporation

THE purchaser of any commercial airplane today receives more actual value for his dollar (in terms of labor and material) than he does when he purchases almost anything else that can be mentioned. (The term "labor" is to be understood as including mental labor and research.) At this instant I can hear expostulations and cries, heckling, and disparagement. Echoes of voices begin comparisons between the prices of 150 horsepower automobiles and 150 horsepower airplanes. This is an old comparison and one that never did have any validity.

Each and every airplane made today is a custom built product, painstakingly built by hand from the raw materials of tubing, wood, sheet alloy stock, wire, cloth, leather, dope and paint, glass, and multitudes of rivets, bolts, washers, and cotter pins. These raw materials come in at one end of the plant and, after the application of thousands of man hours of work per airplane, go out of the other end as perfect units of winged transportation to be used or misused according to the conscience and intelligence of the purchaser. It is the process of transformation that must be compared with the manufacturing methods of other articles, such as automobiles.

A logical development of the automobile industry has caused the centralization of capital into large aggregations which individually possess enormous factories, and thousands of sales agencies, located throughout the world. This massing of resources is the factor that chiefly is responsible for the reduction in price of the automobile. Any given design can be produced in such enormous quantities that the burden placed upon each unit by the cost of automatic tools is relatively insignificant. We read of certain factories turning out six or seven thousand cars a day and perhaps a million cars per year. If this same factory spends ten million dollars per year for automatic and semi-automatic tools with which to form and machine the various parts of their cars, the resulting charge, by simple arithmetic, is ten dollars per car. This constitutes a small percentage of the total cost of the car yet permits an enormous reduction in the number of man-hours of labor, per car. The workers are principally engaged in tending the machines that make the parts of the car, but take little part in actually fabricating the parts from raw stock by the labor of their hands. They are occupied with the setting and adjustment of the machines, and the work of keeping them supplied with raw stock to fabricate. After the parts are made, automatic conveyors take them away to the assembly line, where an intricate system permits specialists to attend to the installation of each component, again using automatic hand tools to tighten up the various bolts and nuts and make final adjustments.

The tools used in this process are ingenious and intricate, and, as has been pointed out, very expensive. There are machines that make complex parts from raw rods or strips of metal entirely automatically; there are multiple spindle drills that drill and tap a dozen or fifty holes in a piece simultaneously; there are giant presses that squeeze out half a body, or a fender, with as little time and apparent effort as it takes for the average man to crease his hat. These and dozens of other facilities are at hand because the machine will perform these operations many thousands of times before it has to be reset or rebuilt. Consider the economics of a fender press complete with dies for forming the metal. It costs many thousands of dollars but it earns its way by its ability to transform forty cents worth of steel sheet into a complex fender worth from six to ten dollars; with one crunch of its ram and at a labor cost of a few cents.

If the same fender were made for an airplane the yearly production might be 100 units at the most, and it is obvious that twenty or thirty thousand dollars could not possibly be invested in such an automatic tool and charged off against the fenders for 100 airplanes. To do so would mean charging each fender with a two or three hundred dollar tool cost. Less complex and expensive tools must be employed and these necessarily require the

WALLACE BEERY BESIDE HIS 1937 STINSON RELIANT
The airplane prospect of today is included in the ranks of those who have an active interest in aviation and actually know the difference between one airplane and another.

expenditure of much more hand labor before the raw sheet has been transformed into a finished part. Lead and zinc dies and a drop-hammer may be used in combination with other tools, or the piece may even be hand-formed over a wooden block shaped to the proper design. Either of these methods involves many hours of patient skilled labor, and the result is that the part which costs the car manufacturer a dollar or a dollar and a half, costs the airplane manufacturer ten or fifteen dollars.

In addition to the excessive amount of skilled manual labor involved in the actual fabrication of the parts, there is a very considerable charge against each airplane for the mental labor involved in designing it; and further back in the background, the charges for mental labor involved in the invention and development of the specialized raw materials and the finished constituent parts which the airplane manufacturer must purchase. The engine, instrument, and specialized material manufacturers are faced with the same problem of high cost, which is created by small volume, and naturally pass these costs on to the airplane manufacturer and eventually to the ultimate purchaser.

THE rapid rate of engineering advance in the aircraft industry naturally adds to the cost of each unit. A tremendous amount of enginereing is devoted to improvement and perfection. Although the engineering brains occupied with aircraft design are second to none in quality, the intense effort of all airplane manufacturers to keep their costs low results in a relatively poor scale of compensation. Most able aircraft engineers are compensated chiefly by the satisfaction that they derive from doing an excellent job in a game that they love.

It was not many years ago that the car manufacturer was forced to use production methods similar to those used by the airplane manufacturer of today, and a comparison of the cost of a car of those days and of an airplane of today is entirely fair. As an example: A Twin-Six Packard or a Lincoln Eight in 1920 to 1922 used to cost the purchaser from $6,500 to $9,500. They had motors developing from 75 to 85 horsepower. Their useful life was not contemplated as extending beyond 50,000 to 60,000 miles. Their construction was relatively simple and not particularly refined in detail. No one who is accustomed to the cheapest cars of today would accept one as a gift, if he had to keep it and ride in it.

For the same amount of money today, in spite of a depreciation of 41 per cent in the valuation of the dollar, the purchaser can buy a vehicle that is equipped with a motor of great refinement and reliability, developing from 225 to 285 horsepower; that is capable of running upon the ground and flying through the air; that is equipped with safety glass, hydraulic shock absorbers, a very expensive group of instruments which cost the airplane manufacturer many times more than the cost of a power plant to the car manufacturer; that is provided with heating and ventilating devices, sound-proofing, and a complex control system; and that represents a much greater expenditure of engineering research and skilled labor than the most expensive car of the twenties ever did. The useful life of this modern vehicle has never been accurately determined, so durable is it. It is well known that it extends far beyond 300,000 miles, if the ship is properly maintained and serviced, and has not been abused by being carelessly directed against the side of a mountain in a snowstorm.

To carry the comparison further, the purchaser of today has at his disposal a safe and comfortable vehicle that will transport him at speeds up to three miles a minute; in a straight line over mountains, rivers, bays, and cities. It will allow his appearance and disposition to be unruffled when he arrives at his destination five hundred miles or more from his point of departure. The same money invested in a car in the days when cars were built by hand, put at his disposal a vehicle that would give him a comfortable ride only on the smoothest highways; that was always ready to stray off into the brush at the slightest inattention; and that racked his bones and muscles into utter fatigue and weariness during any trip over two hundred miles in length. In Summer he arrived melted with perspiration and covered with dust, and in Winter he arrived with his temperature reduced to such a point that he was certain that his feet were frozen solid.

The fact that airplanes of today represent full value for the purchaser's money is borne out by the profit-and-loss statements of all airplane companies making airplanes for the commercial market (except transports). In spite of all the economies that they can effect, and the fact that the great majority of their executives and employees are paid with buttons and live on hope and a love of the game, the profits are usually insignificant if they exist at all.

IT IS natural that my heckling friends will now ask, "Why aren't more airplanes sold if they are such a good value for the money? Plenty of those expensive old cars were sold, and the profits realized on their sale formed the foundation of some of the largest present companies." In order to answer that question I will have to take time out to go into a trance and consult my crystal ball. . . .

It seems that the crystal ball shows that the sale of the old expensive cars was aided and promoted by many factors. The prospect could see his neighbor's car on the street any day and it was easy for him to see how it would aid him socially and contribute to his pleasure. Impetus to the sale was added perhaps by a "keep-up-with-the-Jones" feeling, to which his wife probably contributed liberally. With a slight show of interest to the dealer, the prospect took the first fatal step. From that time on, the salesman hounded him day and night, until to gain peace and satisfy his own longings, the prospect finally capitulated. Pride of possession then made him an unofficial salesman for his pet up to the time that he had a dispute with the dealer over some minor service difficulty. In this way the ownership ranks grew until many thousands of cars were sold.

The airplane prospect of today is included in the ranks of those who have an active interest in aviation and actually know the difference between one airplane and another. He gets out to the airport once in a while or reads some aeronautical publication. He either likes flying or has some business use for flying. He does not exist in large quantities. A personal estimate, based on a study of present aeronautical registrations, allows an outside figure of twenty-five hundred prospects who have the desire and the means to purchase new airplanes of some type or make which cost more than three thousand dollars. All of these prospects already possess some sort of a reasonably good airplane, as that is the measuring stick by which their qualifications are estimated.

If our hypothetical airplane prospects trade-in their ships every three years, it leaves us with a hypothetical

THE NEW BEECH BI-MOTORED EXECUTIVE TRANSPORT MODEL 18
The purchaser of today has at his disposal a safe and comfortable vehicle that will transport him at speeds up to three miles a minute; in a straight line over mountains, rivers, bays and cities; it will allow his appearance and disposition to be unruffled when he arrives at his destination five hundred or a thousand miles from his point of departure.

market of 833 medium and large-sized airplanes per year to divide among all the manufacturers. On such a total yearly volume we will be little better off than the legendary Chinese who are reported to make a living by taking in each other's washing.

The average man who used to be a prospect for the seven and ten thousand dollar automobiles has no real contact with aircraft or aviation generally. A discussion with him will reveal that he still thinks of an airplane as a dare-devil's chariot, roaring across the sky with its load of uncomfortable occupants dressed up in helmets, breeches, and boots. He never reads about an airplane except when some unfortunate pilot makes a mistake in the weather and gets his name and picture in the papers. The reader's reaction at that time is one of complete satisfaction with the solidity of his armchair and the stability of the floor on which it stands. Airplanes have no part in his life and he never comes in contact with anything that would sell him the idea of their being of any possible use to him. His neighbor doesn't drive one by his house every day, nor does he see any parked in the streets when he goes to his office.

The average airplane company, because of its small volume of business, cannot afford to spend money for advertising in mediums having wide popular circulation. Our potential prospects are therefore left unmolested by the edifying effect of the printed page and their ignorance of the real safety, convenience, and comfort of modern commercial private airplanes remains abysmal.

The only solution to the problem seems to be the development of a co-operative program of popular advertising, supported by all factors within the aircraft industry. Such a program could be devoted to "selling" the public on private flying, without mentioning the name of any manufacturer in particular. If widely supported by the industry, it would result in swelling the ranks of those who are sufficiently interested in flying to spend their money for instruction, engines, accessories, airplanes, and everything else connected with the industry.

The suggestion is probably naive and Utopian. The industry seems more like a bunch of cats in a bag, each ready to claw the other apart; than it does like a co-operative team of twenty mules, similar to those which used to pull heavy loads of borax over a scorching desert.

There are plenty of examples of co-operative advertising which are known to have benefited entire industries. Brick, Pine, Cypress, Cast Iron, and many other materials come to mind in connection with group selling. Everyone is familiar with the tremendous group effort that has been exerted for years to "sell" California to the citizens of other States. It succeeded so well that it was necessary to turn away thousands of poor people at the borders lest they overtax the relief agencies of the State. This was an unpredictable by-product of the campaign which otherwise is conspicuously successful.

We have plenty of organizations at present that could function without change toward the purpose of selling private flying for business and pleasure. Perhaps if the individual members can see the light, something can be done. Otherwise, our industry will just grow slowly, as the youngsters now building models reach the income brackets that will permit them to enjoy the pleasures and convenience pertaining to the ownership of private aircraft. In the meantime, we will have a lot of fun just because we are connected with the industry which fascinates all its devotees. We will be lucky there, for there is no tax on fun; and very little on the buttons that we will be earning in the meantime.

Whither, Lighter-Than-Air?

Construction notes on rigid airships and a consideration of lifting agents in the light of the Hindenburg disaster.

CREIGHTON I. MERRELL

AS THIS issue goes to press we are stunned by the tragic and disastrous fire that destroyed the erstwhile "Queen of the Skies," Germany's beautiful *Hindenburg*. Now, more than ever before, public attention is focused on lighter-than-air ship development and operation. A year ago, our unanimous thought was of admiration and confidence in the majestic German airship and the remarkable record it made during one operating season; today, there is only sadness over the loss of life, the destruction of the beautiful vessel of the air and consideration of the facts that surround the catastrophe. What will be the fate of such craft? What is the future outlook now that all but the *Graf Zeppelin* and *Los Angeles* went down in tragic failure?

Dr. William F. Durand, of Stanford University, who was chairman of the Navy's Special Commission of Airship Design and Construction, appointed in 1935 after the loss of the *Macon*, had this to say following the destruction of the *Hindenburg*:

"But for this startling tragedy, I should, with some measure of confidence, been prepared to say something like this. Despite our unfortunate experiences with airships in Naval service as adjuncts to a fleet, I am satisfied that, building on past experience and on the large advance in our scientific background of airship design and construction during the past ten years, we are now in a position to design and build large airships with a margin of safety and security which would fully justify their acceptance as means of transport, wherever their peculiar advantages might appear to justify such use. The successful operation by the Germans of airships in commercial service during the past seven years, seems to bear out this conclusion, and I am disposed to believe that there is a field of possible useful service in transocean flights, such as those of the *Graf Zeppelin* from Europe to South America and the *Hindenburg* from Germany to the United States.

"And now in the face of this heart breaking catastrophe, what can I say? I still believe in the substantial accuracy of what I might have said, but with the proviso that helium be used as the lifting gas. Helium is chemically inert and is absolutely safe against any such casualty which has befallen the *Hindenburg*. Here, the United States is in a peculiarly favored position in that we seem to have by far the larger share of the world's supply of helium. Should we sometime have the courage to embark on a program of airship construction and operation, we should have to deal only with conditions regarding which, I believe, my remarks just quoted, still hold.

"Present information is too meager to serve for any extended comment as to the cause of this catastrophe but we may at least hope that such airships as the future may hold will have helium rather than hydrogen as the lifting gas, and be thus relieved of what must be accepted as a major hazard in all cases where hydrogen is used for obtaining the lift."

WITH the widespread interest manifested in dirigible construction, this phase of the subject may be covered briefly.

The hull of a rigid airship is composed essentially of a number of polygon shaped rings spaced along the length of the hull and tied together by stringers which extend from the nose to the stern. The rings give the airship its characteristic shape and act as partitions along the hull between which the gas bags are placed.

The rings, stringers, and all other bracing girders are built up of duralumin, a light alloy composed largely of aluminum but including small quantities of manganese, copper, and other alloys. It is essentially the same material used in building all-metal airplanes. Wire stays are used in large quantities along the structure to brace it. An important strength member is the keel, or sometimes two keels located along the bottom of the hull.

The immense bags which hold the lifting gas are fabricated from the intestines of oxen, the finished material known as "gold beater's skin." The material is very light, tough and of low porosity. The bags are cylindrical and are contained in a sort of cage made of mesh that prevents excessive bulging out of shape. At the top of each bag is a valve which may be opened to permit the gas to escape from the top of the airship when necessary for maneuvering.

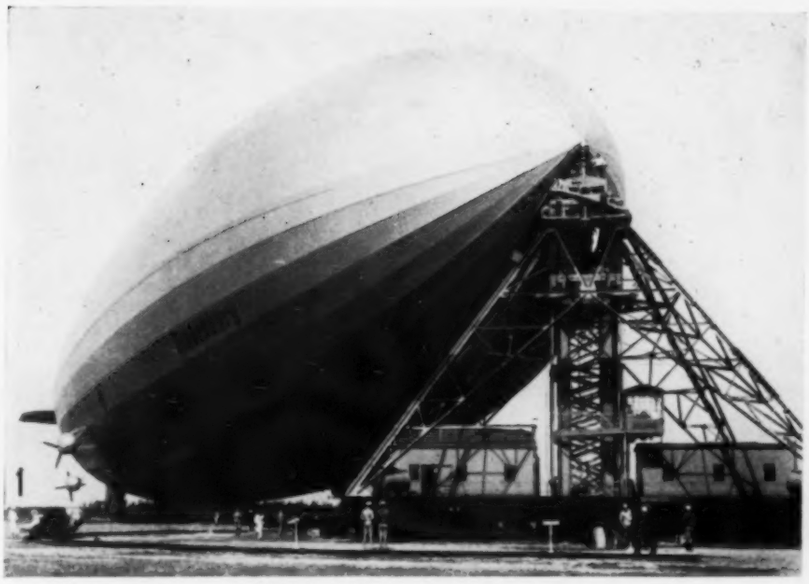
The engine nacelles are attached to the keel structure of the hull. In the case of the *Hindenburg* and most airships the nacelles hung out below the body of the ship. On the American built *Akron* and *Macon* the engines were inside and only the propellers and propeller shafts were in the slip stream to reduce drag. Fuel tanks and water ballast tanks are mounted along the keel of the ship and are spaced along almost the entire length. To service the airship and to move about inside the hull a catwalk is provided which is merely a narrow walk set on top of the keel. While in flight men are stationed along this catwalk at all times to operate valves, make adjustments, etc., according to orders received from the control room.

The outside covering of an airship is merely the common light cotton fabric similar to that used on airplanes, treated with nitrate dope in which aluminum pigment is mixed. The aluminum color is invariably used because it effectively retards heating of the lifting gas by convection due to high reflection characteristic. If the gas becomes super-heated it expands, the valves must be opened to relieve the pressure, and when it is cooled during night flying the gas contracts to the normal leaving the airship without sufficient sustentation.

The control car of the *Hindenburg* and of all dirigibles is placed forward and projects below the hull to provide ample vision in all directions particularly for mooring and maneuvering close to the ground. Passenger accommodations are placed amidships of the hull and do not project outside the body of the ship. The luxuriousness of the accommodations in the *Hindenburg* has been well

publicized and so will not be further described.

Control surfaces consist of horizontal stabilizer and elevators with which the nose is pointed down or up and vertical stabilizers and rudders for turning to right or left. These are of course mounted at the stern of the hull and are operated by wheel controls in the control car forward.



The United States is in a peculiarly favored position in that we have by far the larger share of the world's supply of helium. Helium is chemically inert and is absolutely safe against any such casualty which has befallen the "Hindenburg."

THERE are three possible ways in which the commander of a dirigible may trim and guide his ship. He can use the engines and the effect of the elevators to make the ship dive or climb, since the planing effect of the large hull will materially increase the rate of climb or ascent and also bring about a loss of altitude. The use of the rudders is of course self-evident. To trim the airship for a tail or nose heavy condition water ballast may be discharged from any position along the hull or gas may be valved from any of the individual bags from bow to stern.

The determination of stresses imposed on the structure of an airship is a very difficult problem and one that cannot be arrived at by any direct means. Experience is the best teacher and that is one very good reason why Germany, with 129 completed airships, has the edge on the rest of the world. The greatest stresses imposed on a dirigible occurs when it passes through violent, vertical air currents. An airplane pilot flying through such conditions experiences rapid up and down accelerations but the airplane is short enough that it is not subjected to strong rising and descending currents simultaneously. The long dirigible hull, however, may have the nose section acted on by a strong rising current while the stern may be in an equally fast descending current. This results in a severe shearing and bending stress, which, in a violent thunderstorm may be stronger than the hull can withstand, as apparent in the case of the *Shenandoah*.

The solution to the problem is sufficient experimentation by such methods as the use of strain guages on the structure of an airship under various flight conditions to determine what reactions do take place. Proper navigation and meteorological experience is also very necessary for the commanding personnel to insure that the airship may pass through inclement weather without entering any dangerous atmospheric conditions. The *Hindenburg* made many scheduled flights in 1936 through very unfavorable weather without unpleasant experience due to the fact that the personnel were exceptionally well trained in the subjects of navigation and meteorology.

OF PARAMOUNT interest today is the subject of hydrogen versus helium as a lifting agent. Admittedly, the sentiment now demands helium as regards the public and experts alike. The high inflammability of hydrogen was never so vividly demonstrated before as it was at Lakehurst with the loss of *Hindenburg*. The blaze had consumed all the gas and inflammable material on the craft almost before any steps could be taken to combat it. However, it is pertinent to point out some of the factors that dictate the use of each gas as a lifting medium.

Hydrogen, being the lightest substance known, has more lifting capacity than any other gas and will support eight per cent more weight than helium. It is relatively inexpensive to produce since it is obtained from many sources. It is cheap and the commander of the airship may valve it in whatever manner deemed necessary without any special thought to the cost involved.

Unfortunate it is then that hydrogen has a remarkable capacity to combine with oxygen in the air and when a proper mixture is made with air any slight ignition can produce the most violent explosion possible. Hydrogen was first discovered in 1766 by the scientist Cavendish and was used in all balloons and airships until the United States first used helium in a non-rigid blimp in 1922.

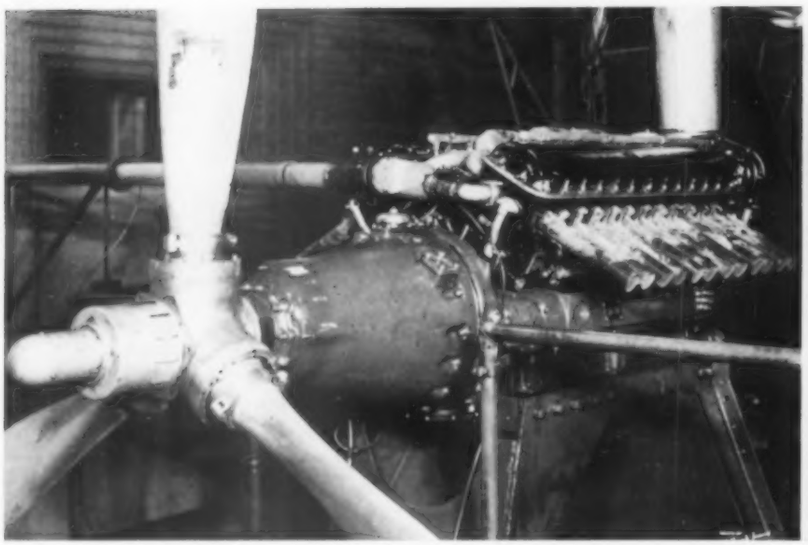
Helium, however, has a much different story. It was not discovered until 1895 by an experimenter named Ramsey. By 1915 only 100 cubic feet of this rare gas had been obtained and the cost stood at the staggering figure of $1700 per cubic foot, Later, new processes were developed that proved satisfactory in extracting helium from the gas in oil wells near Dexter, Kansas and Amarillo, Texas. It is from the latter place that most of the helium is now produced since the Dexter production has been curtailed. From these two areas only has the rare gas been found in anything like usable quantities the world over.

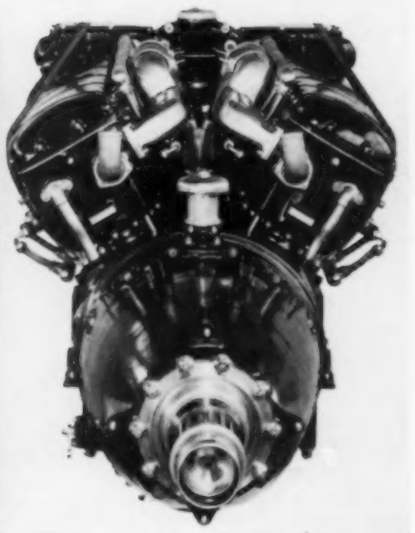
The present cost of helium gas is about one cent per cubic foot. The gas volume of the *Hindenburg* is 7,063,000 cubic feet and thus the cost of filling would amount to $70,630 with no allowance for adding to the supply at the end of each trip. During a trip something must be done to compensate for the decrease in weight which takes place as the fuel is consumed. When hydrogen is used the gas is valved as the weight decreases to prevent the airship from ascending constantly higher. This, of course, would be impractical when helium is employed.

While operating the *Los Angeles* and *Shenandoah* the U. S. Navy developed a process of recovering moisture from the exhaust of the engines and storing this in ballast tanks to compensate for the fuel used. This method is highly successful and answers the problem effectively except for the added weight of the recovery machinery. This is offset by the fact that no precautionary equipment need be added to prevent danger of fire as is necessary on a hydrogen filled ship. Helium is an inert gas and

(Continued on Page 22)

Allison V-1710 1000 H.P. Engine





Left: The Allison 1000 h.p. normal rating aircraft engine on the test stand after successfully completing the 150 hour standard Air Corps type test. Right: Front view showing the compact design that should make possible some interesting streamline plane designs.

FROM the Air Corps at Wright Field, Dayton, Ohio, comes the news that the U. S. Army aircraft engine type test approval has been granted to the Allison V-1710 aircraft engine which completed the necessary tests April 23, 1937. This is the first engine to pass the Army 150 hour type test for engines of one thousand horsepower, or larger.

It is interesting to note that the Allison engine is a Vee type twelve cylinder design, chemically cooled instead of the widely used radial air cooled design that has done so much to date to enhance the progress of American aviation.

The chemist has contributed to the new era of powerful aircraft engine designs by developing synthetic coolants that have high boiling points and low freezing points. These coolants have replaced water which has been generally used for liquid cooled engines in the past. Ethylene Glycol is the coolant used in the Allison engine. It has a boiling point of 387° F. thus permitting more effective cooling radiators to handle the heat transfer from cylinders to atmosphere, than water which boils at 212° F. and therefore requires larger radiator area.

The Allison 1710 cubic inch chemically cooled engine is a 12-cylinder 60° V-type with built-in reduction gear of 2:1 ratio and with a centrifugal supercharger which is a part of the accessory housing. The engine is made up of a cast aluminum upper and lower crankcase and two 6 cylinder blocks, each consisting of single aluminum alloy casting containing the combustion chambers and valve mechanism and into which the steel cylinder barrels are fitted. The valves, of which there are four per cylinder, are driven by an overhead camshaft completely enclosed and flooded with oil. The valve mechanism is accessible by means of a single cast magnesium alloy cover extending the length and the breadth of the cylinder head. The heat treated steel cylinder barrels, the valve seats and valve guides, are pressed and shrunk into the machined cylinder head castings. The exhaust valves and valve seats are Stellite faced.

Each of the two cylinder blocks consisting of the aluminum head, six steel barrels and a cast aluminum jacket are mounted to the upper half of the crankcase by 14 long stud bolts extending through the head and into the case. This construction results in the power forces being transmitted to the crankcase which in turn is stiffened by the truss construction formed by its combination with the cylinder heads and barrels.

The drive for the overhead camshaft is interesting insomuch as the camshaft is driven through beveled gears through the medium of a long slender shaft in the upper part of the crankcase which is driven by the reduction gear at twice engine speed. This long shaft has relative high flexibility and results in a valve actuated mechanism free from torsional disturbances.

The crankshaft is a conventional six throw type, all surfaces of which are lapped or polished. The crankshaft journals are hollow and fitted with removable aluminum alloy plugs. The counter-weights are welded to the forged shaft, providing a clean, compact design. The propeller reduction gear pinion is splined directly to the front end of the crankshaft. A spur gear is splined to the rear end of the crankshaft driving the oil pump, coolant pump, fuel pump, vacuum pump and generator. The engine starter also operates through this gear. The engine is equipped with a vibration friction damper at the front end and dynamic torsional balancer at the rear end. These devices provide for a large range of over-speed without detrimental vibration.

The reduction gear consists of an internal spur gear which meshes with the pinion gear splined on the crankshaft. The internal gear is bolted to the propeller shaft by a flange which is integral with the shaft. A large single piece steel back bronze bearing completely encircles the external diameter of this internal gear. This type of reduction gear results in an unusually compact as well as light weight and rugged design.

The reduction gear together with the propeller shaft are encased in a single aluminum allow casting which forms the nose of the engine. This in turn pilots into and is stud fastened to the upper and lower crankcase assembly.

The propeller shaft assembly located in the reduction gear housing consists of two hollow tubular shafts which are concentric with each other. The inner shaft transmits the power torque of the engine while the other shaft takes care of the bending loads produced by the propeller.

The pistons are machined from aluminum allow forgings and the underside of the piston heads are grid-ribbed to facilitate cooling. The connecting rods are of the forked and blade type machined and polished all over. Two rods are mounted on each crankpin with a single split steel back bearing faced with lead bronze inside for crankpin bearing and outside for the blade rod bearing.

The accessory housing is mounted directly on the rear of the crankcase and is a magnesium alloy casting and contains the centrifugal supercharger and the drives for the coolant pump and camshafts, fuel pump, vacuum pump, oil pump and generator. The supercharger impeller is 9 ½" in diameter and is driven at 6.75 times the crankshaft speed. High supercharger efficiency is obtained by six curved vanes in the diffuser passage. The supercharger impeller shaft is supported on two steel back lead bronze floating bearings which results in unusually trouble-free supercharger operation in spite of the high speed involved. The supercharger, like the camshaft is driven from the reduction gear by the long flexible shaft and obviates the necessity of clutches usually required to take care of the effects of rapid changes of speed of the crankshaft.

A single Bendix Stromberg four-barrel down draft carburetor with automatic mixture control mounted on the rear of the accessory housing supplies the fuel-air mixture to the supercharger which delivers the mixture to the ramming type manifolds. The manifolds contain grids to prevent back-fire flames from reaching the supercharger.

Ignition is supplied by one fixed timing high tension Scintilla double magneto. The current of the magneto is distributed to the spark plugs through two separate camshaft driven high tension distributors. Two spark plugs are used for each cylinder. When the engine is enclosed in a tight cowl, a blast of cooling air for the exhaust plugs is supplied by a light aluminum alloy manifold.

The V-type chemically cooled engine has distinct advantages for the installation of an exhaust driven turbo supercharger which can be located immediately under or to either side of the engine with a short exhaust line and short air pressure lines to the intercoolers and the carburetor. Chemical cooling also permits locating radiator equipment in such places on the plane where a minimum drag is experienced thus making more of the engine output available for useful work.

SPECIFICATIONS:

Bore 5.5, stroke 6.0". Displacement 1710 cubic inches, overall length 94.47", overall height 50.94", overall width 28.94". Geared, chemical cooled, normal and take off rating 1000 horsepower at 26000 r. p. m. on 87 octane commercial fuel. Compression ratio 6.0:1, blower ration 6.75:1, propeller shaft ratio 2:1. Weight with magneto, carburetor, coolant pump and pipes, exhaust stack flanges, tachometer, fuel pump, vacuum pump and generator drives and provision for hydro or electric controllable pitch propeller and governor—1280 lbs. or 1.28 lbs. per horsepower.

CONSTRUCTION:

Crankshaft—Chrome Nickel Molybdenum steel forging.

Crankcase—Aluminum alloy casting, upper and lower halves.

Cylinder Assemblies—Cast aluminum alloy heads and jackets with steel sleeves.

Pistons—Forged aluminum alloy with 3 compression and 1 oil rings.

Piston Pins—Full floating type.

Connecting Rods—Chrome nickel Molybdenum steel forgings. I section machined and polished all over.

Bearings—Allison lead bronze steel back for crankshaft, connecting rod and reduction gear.

Accessories—Scintilla double magneto and distributors, Stromberg carburetor, BG spark plugs and Rich valves.

1937 W670 Continental Engines

THE 1937 Continental W670 Aircraft engines have Department of Commerce Approved Type Certificates No. 162 and No. 168 with ratings as follows:

Series K—225 BHP at 2175 RPM (With Carburetor).

Series K-1—230 BHP at 2175 RPM (With Fuel Injector).

Series M—240 BHP at 2200 RPM (With Carburetor).

Series M-1—250 BHP at 2200 RPM (With Fuel Injector).

Both Series K engines have low compression and require aviation gasoline with octane value not less than 65. Both Series M engines have high compression and require aviation gasoline with octane value not less than 80.

The Continental W670 Aircraft engine differs from the earlier R670 model engine principally in the engine pressure circulating oil lubrication of the valve gear which eliminates servicing of rocker boxes. Improvements have been made to the finning of the cylinder head so that the fin area is increased and cooling air circulates directly by every fin. Other improvements are a larger rocker arm bearing and an increased size of oil sump connected to both nose and accessory ends of the engine.

The fuel injection system to replace the carburetor has been developed in conjunction with the Marvel Carburetor Company. This device eliminates the need of heat to prevent "icing" and bad distribution. The fuel injection inherently gives equalized fuel distribution and hence better economy or less gallons per hour. Additional advantages of the fuel injection are increased engine power and smoother engine operation.

The possibility of using a larger range of fuels (motor as well as aviation) has not yet been explored. All testing including Department of Commerce Type tests and flight service to date has been done with aviation gasoline.

Briefly, the fuel injection system consists of an engine driven injector unit which runs at half engine speed, an injector discharge nozzle in each intake pipe adjacent to the cylinder, an air throttle valve at the entrance to the engine intake manifold, controls for altitude compensation and engine speed, and a constant pressure engine driven fuel pump. The airplane cock-

(Continued on Page 34)

Louisiana Goo

**An aerial hitch-hiker finds variety
from banquets with bankers to D**

LARRY J. FIS

SOMEBODY ought to take a great big bow and we nominate Glynne Jones and his Louisiana associates. They certainly deserve one for making Louisiana's first state-wide air tour a huge success.

This report is sorta hazy and so is the reporter because—well, you've been on air tours. Anyhow, I was mighty glad to find that "Buck" Rowe had an extra seat in his shiny, new, orange Gulf Stinson when they landed at Lakes Charles.

Starting at Shreveport on April 15, Louisiana's first air party, sponsored by the state National Aeronautic Association, made stops at Mansfield, Natchitoches and De Ridder the first day. We learned how mayors and city officials made speeches at each stop.

Harry Watson, Lake Charles member of N. A. A., began to get anxious about noon and we both heaved a sigh of relief when the ships showed up about an hour late. They were promptly rushed to the country club where a barbecue was served jointly with a bankers convention, which happened to be in session. A historic occasion, for this was just about as close as pilots and bankers will ever get together. The bankers had eaten up most of the food but nobody cared because the "refreshments" still remained.

I found it almost impossible to keep tab on who was in the airmada or how many ships. They joined here and dropped off there, but at the end of this report you'll find a fairly complete list of participants. There were about twenty-seven ships for the luncheon stop, however,

PHOTOGRAPHIC LOG OF THE PELIC

**1. Silhouette snapped from the hitch-hiker's lounge in the rear of R. Z. Glass' Beechcraft. 2. Th
3. The Jimmy Wedell Monument at New Orleans, with Helen Johnson, Texas NAA governor, and
the Bankers got all the grub. 5. "Down Under"—a side-trip to the salt mines on Avery Islan
"Bird City" on Avery Island. 7. Home field of Dixie's Delta Airlines, the municipal airport at
lunch on Avery Island. 9. Five 99'ers, left to right: Blanche Noyes, Helen Johnson, Fanny Leo
invitations to the Pan American Exposition in Dallas to Lafayette's mayor. 11. J. Maxine Rov.
Spanish moss. 14. EPILOGUE of a succes**

Goes Touring

variety of entertainment extending rs to Dudley Avery's salt mines.

(Staff Photos)

Y J. FISHER

and they soon got underway for Lafayette, first night stop.

Now Lafayette is famous for its hospitality to visiting airmen but, as ship after ship landed on the little city's splendid airport, it began to look as if that hospitality was to be severely taxed.

But Lafayette was there! J. Maxime Roy, air-minded mayor, gave a brief speech and waiting automobiles carried the tourists for a trip through the famous "Le Jardin des Mouton," garden showplace of Congressman Robt. L. Mouton. That evening, a special floor show and banquet at the Edgewater club offered highly appreciated entertainment. R. L. Briant, Lafayette member of the N. A. A., made a fine master of ceremonies and the ladies of the Evangeline chapter did such a fine job of hostessing that the air party almost decided to stay there permanently.

But the group got underway, mostly via automobile, for the Avery Island visit, one of the highlights of the trip. Through courtesy of Dudley Avery, president of the Evangeline chapter, the group was granted permission to visit the salt mine. Operations of the mine were suspended in order to accommodate the crowd.

Pilots think nothing of flying over the ground, but some of them were dubious about going 550 feet *under* it. Pitching down the mine shaft in the little car which held 13 persons, the pilots did some real blind flying in the utter darkness. The mine proved most interesting as did the subsequent tour of the famed "Jungle Garden."

With his charming mother as hostess, Dudley served a delightful luncheon on the grounds of his historic home on the Island. A fine place to spend the afternoon under the old, Spanish moss draped trees, but there was a schedule to be maintained (theoretically at least) so the good willers hustled back to Lafayette and took off for Patterson.

Here, at the famous Wedell-Williams field, coffee was served in the hangar which had served as a factory for the famous Wedell-Williams racing ships. Despite the line-up of visiting aircraft, the field seemed strangely deserted as the pilots silently paid tribute to the memory of Walter and Jimmy Wedell and Harry P. Williams, who gave their lives to aviation.

On to the Texaco field at Houma, where Embry Hunt greeted us with handshakes and warm welcome. It is here that the Texas Company base their amphibs for commuting to their oil field out in the Gulf of Mexico. Thence on to New Orleans for the night. Even Shushan found difficulty in housing the thirty-three airplanes now with us. No formal program being planned, small parties went out on their own to investigate the many sites and sights in the Crescent City, including of course, the Vieux Carre.

A take-off and flight, straight across Lake Pontchartrain to Covington, followed the next morning and at noon the air caravan landed at Baton Rouge. Met with a police escort and special cars, the group was hustled out to Louisiana State University. This ride proved to be one of the most thrilling experiences of the air tour.

A pleasant surprise had been arranged for the luncheon program. The speeches were made *during* the meal, an innovation that would go over well with any luncheon

(Continued on Page 34)

THE PELICAN STATE'S FIRST TOUR

craft. 2. The ex-mayor of New Orleans' daughter, Miss Augusta Wamsley, amateur pilot. overnor. and Glynne Jones, Louisiana NAA governor. 4. The barbecue at Lake Charles where Avery Island, 550 feet below the surface. 6. One of the most beautiful scenes on the tour— airport at Monroe, final stop. 8. Southern mammy's tend to their winged chilluns at the , Fanny Leonpacher, Edna Gardner, Mrs. Fritz Martin. 10. Texanita Lanny Bowman brings Maxine Roy, Lafayette Mayor and 12. his municipal airport. 13. A restful interlude beneath of a successful tour, clippings and all.

News of the Month in Review

The Manufacturers

Sales of American aircraft, aircraft engines and spare parts totalled $20,496,517 during the first three months of this year, an increase of 67.9 per cent over the same period last year, according to a survey of the Aeronautical Chamber of Commerce of America, Inc. A total of 392 commercial aircraft, valued at $4,322,262, were delivered during the three months this year, as against 183 machines, valued at $1,519,605, in the same period of 1936, an increase of 118.6 per cent.

Of the 392 planes delivered in the first quarter this year 168 were machines selling for less than $1,500, without engines, showing a very substantial market for light planes to be used by private owners. At the same time the industry delivered 50 machines in the air transport class, selling for more than $15,000 without engines.

The complete analysis of commercial deliveries follows:

	Units	Value
Under $1,500	168	$ 152,451
$1,500-$2,500	34	64,955
$2,500-$4,000	77	269,601
$4,000-$6,000	50	254,338
$6,000-$10,000	13	83,298
$10,000-$15,000		
Over $15,000	50	3,497,619
	392	$4,322,262

A total of 96 military aircraft were delivered during the first quarter as compared to 171 military machines in the same period last year. On the other hand the value of the military planes, less engines, was $4,759,454 this year as compared to $3,137,047 in the 1936 period—a 51.7 per cent increase in value.

Total airplanes delivered during the first quarter this year had a total value of $9,081,716, without engines, the value of commercial deliveries being 47.6 per cent of the total.

Deliveries and production during the first quarter were approximately equal, according to Mr. Rogers, whose survey covers the entire industry.

The value of commercial production and deliveries was keeping pace with military production and deliveries, during the first quarter, as shown by the following table:

	Units	Production	Value Per Cent	Units	Deliveries	Value Per Cent
Commercial Airplanes	401	$4,360,611	21.3	392	$4,322,262	21.1
Military Airplanes	93	4,710,736	22.9	96	4,759,454	23.2
Commercial Engines	800	3,073,268	14.9	791	2,990,953	14.6
Military Engines	484	3,375,333	16.4	488	3,425,147	16.7
Airplane Spares		3,171,846	15.6		3,171,846	15.5
Engine Spares		1,826,855	8.9		1,826,855	8.9
		$20,518,649	100.0		$20,496,517	100.0

Showing a substantial gain, deliveries of the LOCKHEED AIRCRAFT CORPORATION for the three months ending March 30, 1937, amounted to approximately $1,000,000, according to Robert E. Gross, President. This compares with deliveries of about $325,000 for the same three-month period in 1936.

The current backlog figure as of April 30, 1937, stands at $2,972,000 compared with $750,000 as of the same date last year.

Receipt of an order from the U. S. Navy Department for four Lockheed 12 transports was announced April 12. The order will total $205,513 although negotiations for a fifth plane are now under way which, if consummated, will raise the figure to nearly $258,000.

Intended for the use of Navy personnel, the planes are to be standard six-passenger ships powered with Wasp engines. Carrying six persons, two pilots and cargo, they will have a cruising speed of 213 miles an hour and a top of 226.

A new speed and endurance record for small transports was established recently when the Lockheed 12 operated by the Halliburton Oil Well Cementing Company completed an 8,000-mile trip around Central America at an average speed of 205 miles per hour.

The plane was flown by W. E. Hottle, Halliburton pilot. Leaving Duncan, Oklahoma, the plane flew to Miami, Florida, thence to Tegucigalpa, Honduras, and back to Duncan via Brownsville, Texas. During the entire trip the only repair necessary was a single motor checkup at Honduras. On the last leg of the flight, Hottle, with Earle P. Halliburton, owner of the plane, and his brother, John, flew the 2,250-mile stretch between Guatemala City and Duncan, Okla., in 9 hours and 55 minutes with only one stop. They left Guatemala at 6:30 in the morning and arrived at the home hangar at 5:00 p. m. the same day.

THOMPSON PRODUCTS, INC., Cleveland, has acquired the assets and business of the Jadson Motor Products Co., Bell, California, according to an announcement by Fred C. Crawford, president of the Cleveland concern. The plant in California gives Thompson Products the advantages of complete manufacturing facilities on the Pacific coast and is expected to improve service to replacement and original equipment customers in the west.

The Jadson company will continue manufacturing and sales activities under its own name and basic policies followed by both companies in the past will also be continued. The active managing personnel of Jadson is unchanged, with C. V. Dachetler acting manager and A. E. Robb, vice president of engineering and sales.

Plans have been announced for the construction of a $300,000 addition to the plant of NORTH AMERICAN AVIATION, INC. More than double the existing floor space will be provided by the new unit, which will place 200,000 additional square feet at the company's disposal. Upon completion of the structure, the present number of 1,200 craftsmen will be boosted to 2,000 men. Back orders now totaling $7,000,000 are now sufficient to keep the factory operating at capacity for two years.

Orders totaling nearly four million dollars from foreign governments were announced recently by Don P. Smith, vice president of the VULTEE DIVISION, Aviation Manufacturing Corporation. Export business has forced an expansion of the present plant facilities and an increase in personnel now totaling 600 craftsmen and 75 engineers.

At the annual meeting of the DOUGLAS AIRCRAFT COMPANY, Donald W. Douglas, president, informed the stockholders that plane deliveries totaled slightly more than $3,000,000. Deliveries are now running at the rate of approximately $1,250,000 monthly. With the strike ended, the plant is again operating at capacity, with approximately 5,400 men at work.

The company's backlog of unfilled orders on March 29, last, totaled $23,647,620.10 and on the same date the backlog of Northrop Corporation, subsidiary, totaled approximately $6,000,000. The Douglas backlog on that date consisted of Army orders totaling $11,068,608.81, Navy $3,692,829.59, civilian contracts $5,198,353.45, and export orders $3,687,828.25.

Douglas has completed the merger with Northrop and will shortly issue the 6,800 additional shares to be exchanged for the 49 per cent minority interest. This will increase the Douglas outstanding shares to 570,680. The basis of the exchange was arrived at through the estimated annual earning power of Northrop, which was placed between $200,000 and $300,000 a year.

Douglas recently sold its minority interest in the China plane factory to the majority holder, Curtiss-Wright Airplane Company, for $2',000, realizing fully its original investment, Mr. Douglas disclosed.

Development work is proceeding on the new transport plane, DC-4, the 40 passenger airliner to be used on five major transport lines. Exceeding in size the clipper ships now spanning the Pacific, the plane is being constructed at the Douglas plant from plans originally outlined by experts representing T. W. A., American Airlines, Pan American Airlines, Eastern Airlines and United Airlines. These five air transport companies pooled their resources for the development of the ship, costing more than a million dollars. On a production basis, the new giant airliner will cost in the neighborhood of $250,000.

Contracts totaling $4,300,000 for 35 military planes to be built for the Army and Navy of the Argentine Republic have been awarded to the GLENN L. MARTIN CO. of Baltimore, Md. Production will begin immediately with delivery expected late in 1937. The contracts bring the unfilled orders on the books of the company to an excess of $12,500,000, Mr. Martin said.

The Martin plane was selected by the Argentine government after a formal performance competition held in Buenos Aires in competition with entries from Germany and Italy. Manufacturers of the three countries sent demonstrators for the official trials. The Martin plane was the only one of the three flown to the Argentine, the others having been shipped by boat.

The company announces net earnings for the first quarter of 1937 of $339,469.00, or approximately $0.40 per share on the outstanding stock.

Since the Company increased its capital $5,200,000.00 by the sale of common stock in October 1936, it has made substantial progress in its expansion program and the unfilled orders on the books have been materially increased.

The Balance Sheet of March 31, 1937, reflects $7,368,652.00 Current Assets, of which, $4,880,184.00 is cash, as against Current Liabilities of $2,204,606.00.

When completed, the company will have 553,000 sq. ft. of floor area ideally suited to the manufacture of aircraft of all sizes—from the present Martin Bombers now in current production to the large Clipper Type Flying Boats suitable for flying non-stop across the Atlantic Ocean, carrying passengers, express, mail and cargo.

The BELLANCA AIRCRAFT CORPORATION has announced peak production of the Series 28-90 with the first group to be exported to France for use on domestic French mail lines as fast mail carriers. The 28-90 is a low-wing monoplane powered with the 900 h. p. twin-row Wasp, prototype to Capt. Jimmy Mollison's record breaking "Flash." It accommodates a crew of two and 1,000 pounds of mail and express. The company is at work on a new low-wing monoplane, designated as the 17-20, now in the final stage of wind tunnel testing and detail designing. It will offer five-place capacity and be powered by a supercharged Menasco engine. Another type is a multi-motored long range monoplane of high speed. Like the single engined job, this is scheduled to have a landing gear retractable into the low wing.

With production schedules increased to a basis of approximately 10 planes each month, the RYAN AERONAUTICAL COMPANY has made the following recent deliveries of Ryan STA 125 h. p. models to private owners and dealers: Nicholas Morris, Demorr Aeronautical Corp., Paoli, Pa.; Airflite Limited, Sydney, Australia; Bobby Lupton, Detroit, Mich.; Howard Batt, Clover Field, Santa Monica, Calif.; Robert Klein, Central Aircraft Sales, Inc., Sky Harbor, Chicago, Ill.; John Roustone, San Diego, Calif.; and Ben Ashford, Arlington, Calif.

A 125 h. p. model Ryan STA and a Ryan STA Special 150 h. p. model have been delivered to Ted Brown, operator at Los Angeles Municipal Airport, Inglewood, Calif.

Three Ryan STA 125 h. p. models have also been shipped to Haller Aviation, East London, Union of South Africa.

Increasing interest in American aircraft by South American countries has resulted in the Ryan Aeronautical Company at San Diego preparing a special Spanish catalog with full information regarding its new Ryan ST series of planes.

O. J. Whitney, Ryan distributor for the New York-New England territories has just returned from an exhaustive survey flight of South American territory and reports a tremendous opportunity for the sale of American aircraft in many of these countries.

The PORTERFIELD AIRCRAFT CORPORATION, of Kansas City, announces its removal May 15 to larger quarters at 18th and Wabash streets. The new building, with over 50,000 square feet, is four times the size of the plant just vacated.

The removal of Porterfield to a bigger factory building was necessitated by the heaviest back-log orders in the company's history. The new quarters will permit production of three ships daily.

The increased floor space in the plant will permit the employment immediately of about twice the former mechanical force. The facilities of the new location makes possible a production-line plan of manufacture. Improved equipment will be provided in the large sprinkler-equipped plant, including a new and larger paint shop. The factory has an abundance of natural daylight throughout.

Executive offices of the Porterfield firm are on the second floor, which also accommodates the engineering personnel of both the Porterfield Aircraft Corporation and the Porterfield Aircraft & Engineering Corporation. The latter firm is concerned chiefly with the study and planning of military aircraft.

An additional Porterfield development is the recent purchase by the two companies of Richards Field, first airport in the Kansas City area. This airport, comprising 153 acres of desirable level land, will be held by the Porterfield interests for further development. It was at Richards Field that E. E. Porterfield, Jr., president of the Porterfield companies, first learned to fly back in 1925.

Organization of the TAYLOR-YOUNG AIRPLANE COMPANY, manufacturers of light popular-priced airplanes, has been announced by William C. Young, executive vice president of the new company, who stated that it will file very shortly with the Securities and Exchange Commission in Washington, a registration statement covering 290,000 shares of common stock, $1 par value, of which 115,000 shares are to be underwritten by Hiltz & Co. and publicly offered at a price of $3 a share.

Formed to take over the business of the Taylorcraft Aviation Co., a predecessor company, the new Taylor-Young Airplane Company went into production on March 22, this year. Although organization is just completed, plans are already being rushed for plant additions, Mr. Young has announced. The company's present plant is at Alliance, Ohio.

C. G. Taylor, founder and former president of the Taylor Aircraft Co. of Bradford, Pa., heads the new company as President. Associated with Mr. Taylor, who will have supervision over design and engineering, is William C. Young, formerly general manager of the Goodyear-Zeppelin Corporation, who will serve as executive vice president. Frank L. Sullivan, prominent aviation cost analyst, formerly treasurer of Curtiss Air Service, Inc., and recently also vice president of Central Aircraft Manufacturing Co. of Shanghai, China, a Curtiss subsidiary, is treasurer of the new company. Stanley I. Vaughn is

SPARTAN SELECTS
Streamlines
● All Spartan "executive" cabin planes are equipped with General Streamlines and fold-away landing gear. Streamline tires fold into the wing and complete its contour so that "fairing" or covering over the tire is unnecessary. General's expert engineers know how to solve difficult tire problems. It will pay you to consult them.
GENERAL TIRE & RUBBER COMPANY
AKRON, OHIO
GENERAL Streamline AIRPLANE TIRES ★ KNOWN 'ROUND THE WORLD FOR SAFETY

factory manager in complete charge of production, having resigned as manager of experimental production of the Curtiss Aeroplane Company on March 1 to take up this new work.

The TAYLOR AIRCRAFT COMPANY of Bradford, Pennsylvania, manufacturers of the "Cub," who produced over 35 per cent of commercial plane production during the first three months of this year, are planning facilities for the production of 400 "Cubs" per month. A huge backlog of unfilled orders and optimistic reports from dealers and distributors in 40 countries were given reasons for the move. The company has announced annual awards totalling $15,000 to encourage college flying. Selection of five college graduates, who will enter the Taylor factory for a period of two years, the "cadets" will receive 200 hours of instruction together with thorough training in all departments of the aircraft factory. Announcement of the 1937 winners will be made in June.

A new type throttle, supplanting the push-pull type, and an improved side window with hinges and opening arm are added improvements to 1937 "Cubs."

The REARWIN AIRPLANE COMPANY has announced their Sportster Models 9000 and 9000-L have been approved as seaplanes with the new Model Edo floats No. 1620. Performance as a seaplane is highly satisfactory with cruising reduced by only five miles an hour. Full load takeoffs are negotiated in 20 seconds. Sales of the deluxe Sportsters with ball bearing cabin controls concealed and large luggage compartment are outselling the standard models.

Mr. Gosta Andreed, famous Swedish pilot, spent several days at the Rearwin factory during April. While in this country he also attended the Pacific Aircraft Show. One of Mr. Andree's principal missions in America was to pick out a medium weight airplane which would be well adapted for use by Swedish flying clubs. He chose Rearwins and the initial order for a Rearwin model 9000 with wheels and also with a set of Edo floats was shipped May 1st. Plans call for the purchase of several more Rearwin Sportsters in the near future.

The first 1937 model Rearwin in Sweden will have a company in Norway. The Wessel Flyveselskap, of Oslo, purchased a Rearwin model 9000-L with wheels and floats so that the plane can be used interchangeably on land and water. Mr. Peter Wessel visited the Rearwin factory some time ago.

MENASCO MANUFACTURING COMPANY reports the sale of two engines of its largest model to the Bellanca Aircraft Corporation of New Castle, Delaware. The engines ordered are of the C6S-4 model rated at 250 h. p. at 5,000 feet and at 290 h. p. for take-off. This model is the latest of the inverted, in-line aircraft engines developed by Menasco. The secrecy which surrounds the type of plane being built by Bellanca around the two Menasco engines, indicates a new model being developed by this world-famous aircraft builder. Delivery of these engines is scheduled for May 15th, according to Menasco officials, and marks the first sale of Menasco engines to the Bellanca Aircraft Corporation.

First of fifteen aircraft engines purchased by the Dutch Navy from the Menasco Manufacturing Company has been shipped to Holland and work commenced on the subsequent 14 engines of the order. These engines are of the Menasco B6 model rated at 160 h. p. and will be used in training planes of the Dutch navy.

Other deliveries and orders announced were to Rudy Kling, famous racing pilot, a set of ten for the Ryan Aeronautical Company, an order for five from Stearman-Hammond and an order from Germany for a supercharged 150 h. p. engine for installation in a Focke-Wulf trainer.

Giant airplane tires, each casing designed to carry 15 tons, are being manufactured by THE B. F. GOODRICH COMPANY, Akron, Ohio, for installation on the first of a fleet of 40 passenger supertransport airplanes now nearing compietlon in the factories of Douglas Aircraft Company, Inc., Santa Monica, Calif., according to S. B. Robertson, Goodrich president.

The new tires, five feet five inches in diameter, the largest ever built for an American airplane, are two feet across at the base and weigh approximately 360 pounds. The tubes alone weight 45 pounds.

A $200,000 school for training aeromechanics and engineers will be established on a fourteen-acre tract near the Grand Central Air Terminal, Glendale, California.

Work has already begun on the administration building, while permits for three other units have been applied for. The buildings will cost approximately $100,000, while more than $100,000 worth of equipment will be used.

The new institute will be controlled by an advisory board consisting of Edward Zuchelli of the Northill Company, Inc., as executive vice president and general manager; John K. Northrop, president of the Northrop Corporation; Charles Van Duzen, vice president and superintendent of the Consolidated Corporation of San Diego, and Robert Gross, president of Lockheed Aircraft Corporation.

BOEING AIRPLANE COMPANY and subsidiary companies reported a consolidated net profit for the first quarter of 1937 of $115,937.73, after provision for Federal normal income tax but without provision for Federal surtax on undistributed profits. The figure represents earnings of 22.2 cents per share, according to C. L. Egtvedt, president.

Egtvedt reported that first quarter sales, operating revenue and other income amounted to $1,271,103.15, while cost of sales, operating expenses, depreciation, provision for Federal normal income tax, and other deductions totalled $1,155,166.42. The allowance for depreciation was $29,331.11; the income tax provision (not including allowance for Federal surtax on undistributed profits) was $19,982.48.

Directors of the company announced that plans are under way for the offering of additional shares of stock, following the authorization by stockholders at a special meeting May 7 of an increase in the company's authorized capital stock from 600,000 to 800,000 shares. The proposal, as approved by stockholders, includes the offer and sale of stock to stockholders and the setting aside of 12,000 shares for sale to officers or employees at a price not less than the price of the offering to stockholders. Details of the offering, as to price and number of shares, have not yet been worked out. The directors have determined, Egtvedt said, that it may be advantageous to have the offering to stockholders underwritten, in which case the stock offered to stockholders but not subscribed by them will be sold to the underwriters at not less than the offering price to stockholders.

MISCELLANEOUS OPERATIONS

Miscellaneous aircraft operators flew 51,803,290 miles in the last 6 months of 1936 and carried 934,263 passengers, the Bureau of Air Commerce, Department of Commerce, announced today.

The mileage flown total was the highest for any six-year period since July-December, 1930, and the passenger total was the greatest since July-December, 1931.

Miscellaneous flying embraces all civilian flying other than that of scheduled air lines, and includes charter and taxi service, flight instructiotn, experimental and test work, special services like crop dusting and photographic flying, and private flying.

Whither, Lighter-Than-Air?

(Continued from Page 15)

will not burn even though heated with a blow torch in the presence of pure oxygen. Outside of the cost the loss of eight per cent in lifting capacity as compared to hydrogen is the chief disadvantage.

In closing a few facts on the 1936 operation of the *Hindenburg* will show what a fine record the airship made in the one season of operation.

The first commercial scheduled airship flight between the United States and Europe was made May 6, 1936, from Frankfort-am-Main, Germany, to Lakehurst, New Jersey. The service was set up by the Deutsche Zeppelin Reederei Company and a total of ten round trips were made, the last being made October 15, 1936. All the trips were made close to schedule and without mishap. The one-way distance traveled by the *Hindenburg* measured 3,894 miles and the westbound trip was made in an average of sixty-four hours. The average eastbound trip was made in fifty-two hours.

The passenger list amounted to from twenty-one to seventy-two passengers. Berth arrangements had to be expanded from fifty to seventy spaces before the close of the season. One way fare amounted to $400 and the round trip ticket cost $720. Mail loads ranged from 167 to 2,260 lbs. at forty cents per half ounce. Freight was carried at the rate of one dollar per pound and a Beechcraft airplane and automobile were carried at various times. In addition to the trips to United States the airship made one trip to South America. She carried four Diesel engines, each of 4,400 horsepower. With a length of 811 feet, gross lift was 472,940 lbs., gas volume 7,063,000 cubic feet and weight of 220 tons. Maximum speed was 84 m. p. h. with a cruising range of 8,750 miles.

What would have been the *Hindenburg's* record had she been carrying helium? That is the question that will be answered with future developments in spite of the bitter experiences of the past.

Ports of Call

Correspondence from the Airports and Airways

Atlanta, Georgia

By Dan Green

Preliminary plans for the second annual Georgia Air Tour were made at a meeting of the Atlanta Chamber of Commerce Aviation Committee members and others interested in aviation in Georgia.

Baxter Maddox, Chairman of the Committee, appointed sub-committees to work out the details of the tour. Last year's aerial jaunt, which was participated in by about forty planes which made a complete circle of the state in three days, beginning and ending at Atlanta, was such a big success that the Atlanta Chamber of Commerce and the National Aeronautical Association, co-sponsors of the tour, have under consideration making the Georgia Air Tour an annual event to take place every summer.

Chambers of Commerce in other cities and towns throughout the state will be invited to participate in sponsoring the air tour and plans are being made to raise the necessary funds to conduct the aircade by donations from Georgia manufacturing firms. Programs outlining the flight and participants will be distributed at each airport visited. Donating firms will have advertisements in the programs also.

The dates of the tour have been tentatively set as June 17, 18, 19 and 20. The 1936 Georgia Air Tour required three days and not as many places were visited as will see this year's aerial tourists. This year's tour will require a full day more than in 1936 and it is planned to depart from Atlanta on Thursday morning, June 17, and return on Sunday, June 20.

Final arrangements for the places to be visited on the tour have not as yet been worked out, but present indications are that stops will be made at LaGrange, Griffin and Macon on the first day of the tour; Columbus, Americus, Albany, Moultrie, Thomasville and Valdosta on the second day; Sea Island and Savannah on the third day; and on the final day, Augusta, Athens and return to Atlanta.

This itinerary is only tentative and it is possible that the route may be changed before the start of the tour.

Assisting Baxter Maddox in arranging for the tour will be Major Ralph Lockwood, tour manager, who is also representative of the Aviation Department of the Gulf Refining Company. This oil firm will furnish gratis all gasoline and oil required by the planes to make the tour.

In addition to receiving free fuel, all pilots will also have their expenses paid for on the trip by the tour committee.

Dick Hager, Eastern Air Lines representative in Atlanta will be in charge of Atlanta arrangements for the tour. Dan Green, of the Atlanta Georgian and American, is in charge of publicity; Jesse Draper, chairman of out-of-town arrangements committee; David Marx, Jr., finance committee; and Oscar Bergstrom, Delta Air Lines representative in Atlanta, will have charge of the Program Committee.

According to reports from the office of Major Wiley R. Wright, Georgia Goveror for the National Aeronautical Association and Inspector for the United States Department of Commerce, Bureau of Air Commerce, who is in charge of the technical arrangements for the Georgia Air Tour, applications for participation in the aircade have already been received from several states including Montana, Mississippi and North Carolina, as well as Georgia.

It is expected that more than sixty planes will take part in the Georgia Air Tour which is designed primarily to arouse interest in aviation in this state and to advertise Georgia products. Pilots and plane owners desiring to take part in the tour are requested to communicate with Major Wiley R. Wright, Atlanta Municipal Airport, Atlanta, Ga.

Beaumont, Texas

By Larry Fisher

Spring urges up the flying blood out at the Beaumont Municipal and local operators Vickers and Parker are keeping busy with students.

Spot landing contests are again in the air and Lois Neel, Beaumont's woman transport, won the first in the Wing Over club series.

Additional WPA projects for the Amelia field are well under way and at present the airport is in the best shape it has ever been. Eastern Airlines finds the runways too narrow for the proposed 21-passenger Douglases and efforts are being made to meet their requirements. Numerous changes in personnel have taken place with this company locally, with transfers and resignations. "Boots" Mevers and Eddie Kleinpeter resigned, the former going to New Orleans and Eddie back to his old love, Baton Rouge. Robert L. Turner is the present downtown traffic manager with Massey Brown and W. C. Strickland holding down the airport end. Traffic has been very satisfactory from this terminal.

Bill Johnson and "Dub" Jackson passed tests for private license under Inspector Clark. Leo Cloney, ex-local fireman now with Eastern, came in for a brief visit. Al Tuerpe, San Antonio Aeronca distributor, came through as did Eddie Ross in the Loffland brothers ship.

Gene Gray, former local pilot now with Pan Am, returned to his native "heath" for a short vacation bringing news that brother Gordon is flying for the same company from Cristobal to Lima, Peru, while the third Gray of the flying family is now with American Airlines.

Another hand, McRee, has been added to the municipal airport staff as helper to Karl Shannon, field maintenance. Bob Laveneder continues as airport manager.

A new "boarder' is V. K. Stockton's Fairchild. Stockton lives at Lake Charles and formerly kept his ship at Orange. Attempting to take his plane out recently, he suddenly discovered that the entire airport had been plowed up. He finally managed to take off.

Which is a warning to visitors that the Orange airport is no more. It is now a rice field. Maintained for years, it served as a good emergency field. The nearst airport towards New Orleans now is the Lake Charles field—if they get it finished up.

Birmingham, Alabama

By Earl Wheeler

Claude C. Holmes, WPA superintendent of the new 106th Observation squadron hangers at the Municipal Airport, has been busy placing the big steel hangar doors as they arrived and immediately assigned men to the task of preparing for their erection. Holmes stated that "the two large boilers for the heating plant were in place ready for the

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There must be a reason why REARWIN is FIRST in domestic sales in the $1800-$3500 class. Write for our new folder which gives complete details.

Mr. John Ball of Mitchell, South Dakota, recently learned to fly in his own Rearwin. Two weeks after taking his first lesson, Mr. ball flew alone from our factory to his home—a distance of 500 miles.

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Ninth Continuous Successful Year

Fairfax Airport, Kansas City, Kansas, U.S.A.

"REARWIN popularity is proof of REARWIN superiority"

Duke Jernigin, manager of the Texas Company's aviation division, beside his Wasp powered Stinson Reliant, which was delivered last month. The plane will be used for executive transport in aviation sales work.

foundation to be built and connecting up the radiators and other necessary work would be started at once."

T. R. Sells, superintendent in charge of WPA improvements and repairs to the field and municipal buildings at the airport, reports that 25 of the 40 new drainage inlets have been installed. The surface water will be drained off quickly with installation of the new inlets and most of the mud and water will be eliminated even after the hardest rain. Low places are being filled in with rich dirt and the few bare spots are being sodded with Bermuda grass. Paint has been ordered, and both the hangar and administration building should be sporting a new coat of white when the Seventh National Air Carnival is held June 5 and 6.

Some pretty and excited Southern girl is going to have an honor that no other girl ever had before when the greatest fliers of the day gather in Birmingham for the Seventh Annual National Air Carnival. She is going to be "Miss Aviation for 1937."

This will be the first time that a "Miss Aviation" has ever been selected in this country and she is going to be given the opportunity of doing something that no woman has ever done before. She is going to be taught to fly in one day.

Beautiful girls from Tennessee, Georgia, Mississippi, Florida and from these 15 Alabama cities: Anniston, Cullman, Clanton, Decatur, Dothan, Montgomery, Jasper, Talladega, Leeds, Florence, Sheffield, Tuscumbia, Gadsden, Tuscaloosa, Selma and Birmingham—are coming to the Air Carnival as guest of the Birmingham Aero Club, sponsors of the event.

While in Birmingham, they will not only see the greatest fliers of the day do their thrilling maneuvers, but they will be dined, danced and entered in the contest for "Miss Aviation for 1937.'

All of the Southern beauties in this contest will be special guest at the Aviation Banquet, the Aviation Ball, and other events of the Carnival. Jan Garber, widely known band leader, and his orchestra from Chicago will play at the Aviators' Ball Saturday night.

Birmingham's free aviation shows have made air show history, Mr. Acker stated, and urged that people throughout the South who are interested in aviation development plan to be in Birmingham June 5 and 6.

Not only will there be present the great thrill fliers of the day, he said, but we will have an aviation exhibition both in the air and on the ground that will be educational and instructive.

A very timely appeal for further developing air transportation through this city, was made by John Dearborn, chairman of the Greater Birmingham Committee, at the recent Aero Club luncheon.

Emphasizing the importance of transportation to the growth of the nation's larger cities, Dearnborn added, "It is only logical to suppose that this will be true of the future, and if Birmingham is to continue its all-round progress it must assume an important position as a crossroads of aviation."

"This is particularly important just now as new air mail lines are now being considered by authorities in Washington. The most important of these as far as Birmingham is concerned at the moment, is the proposed new line from Kansas City to Miami, Florida, by way of Memphis and Birmingham. It will mean a lot to all residents here if this and other lines can be brought through our city."

W. S. Young, manager of Leonard Truck Line, Shreveport, La., and J. D. Walker, freight agent for Leonard at Jackson, Miss., spent the day here recently on business. Mr. Young was flying his Jacobs' powered Beechcraft.

Roy Keeley, Bureau of Air Commerce airline inspector, stopped here for fuel enroute from Atlanta to New Orleans in one of the department's Stinsons.

John Carter, Lockheed Aircraft Corp., pilot and Miss Laura Ingalls, one of America's leading aviatrix, acting as co-pilot, made a brief stop here recently for fuel. The Lockheed Electra transport plane was being ferried to New York from Burbank, Calif., for shipment to Czechoslovakia.

George Carter, Delta Airline station manager, Mrs. Carter and their young daughters, Mary and Isabelle, left April 15, for several weeks' vacation in Tampa and Jacksonville, Fla. R. D. Minks, radio operator from the Jackson, Miss., office, will work in Carter's place during his absence.

J. E. Nichols, of Birmingham, has been employed by Delta Airlines as radio operator at Monroe, La. He left April 17, to start in on his new job. "Nick," as he is better known to his friends, has a private pilot's license and a second class radio license. He received his flight training at the Municipal Airport here and for the past three years has been in the radio section of the One Hundred Sixth Observation Squadron.

Ben Maginia, student flyer of Odell Garrison, made his first solo flight in the Bird after two hours and 20 minutes instructions.

Dr. A. D. Henderson and Dr. H. B. Dowling of Mobile, Ala., in a Fairchild 22, spent two days here recently as the guest of Dr. and Mrs. John Hillhouse.

Fred Leslie, one of Birmingham's transport pilots, has purchased a Taylor cub and started a new flying school at the Central Park Airport. Leslie received his transport license at the Municipal Airport here and is a former student of Glenn Messer.

General John G. Persons, of Birmingham, and Major T. C. Blackburn, of The National Guard Bureau, Washington, D. C., arrived here April 22, from Washington in an O-46-A observation plane.

Bloomington, Illinois

By C. A. Zweng

Daily April showers held down local operations, but new students are signing up with flight instructor Art Carnahan with good prospects for a big season. About 50 planes participated in the American Legion round-up April 25th. "Shorty" Schroeder, formerly a Bloomington citizen, is now on the executive staff of United Air Lines. We of this city believe its a distinct gain for United.

At Mt. Hawley Airport, Peoria, L. E. Jackson, transport pilot, who has been storing his Travel Air here, has taken a position as flight instructor at Grand Prairie Airport, between Fort Worth and Dallas, Texas. The Ken Ringel Flying Service is active with a number of new students.

Howard C. Knotts, war-time pilot of Springfield, has been appointed director of the Air Law Institute of Northwestern University. Carl Lewis is operating on the Decatur Airport. The lease has been taken over by the Junior Association of Commerce. Youth has vision.

The Quad City Airmen's Association of Moline has a membership of over 75, all of whom hold licenses. This club holds contests and conducts good will tours. The Hill Flying Club of Freeport publishes a newspaper known as the "Fly Paper." L. C. Wallace is commander of this squadron.

Your correspondent, author of *Aeronautical Training*, A Quiz System," has returned from a business trip through the Southwest. A new quiz text for airplane and engine mechanics will soon be ready for distribution.

Brownsville, Texas

By Guy Bevil

A night training flight of thirteen P12's from Kelly flew to Brownsville and return on the twenty-sixth. The flight was in command of Capt. Jerry McCoy.

Mr. W. B. Leavitt of Houston stopped in Brownsville to clear Customs enroute to Tampico, Mexico. He was flying his Porterfield which he uses for business as well as pleasure. Pilot R. S. Le Sage, flying a Beechraft, dropped in from Corpus on the seventeenth, returning the same afternoon. Pilot S. Nunez, ferrying a Flamingo to Tampico,

stopped over to clear Customs on the twenty-second of April. Pilot M. F. (Shorty) Clark of the Department of Commerce flew in on the twenty-seventh of April. He was in the Department's low wing Kinner.

Mr. Carl Schlaet, oil operator and aviation enthusiast, formerly of Tampico and now of Fort Worth, paid us a visit in his new Beechcraft on the twenty-eighth of April. Mr. Schlaet flies his own plane and uses it extensively for business. Pilot E. Burchard of Monterrey, Mexico, flying his Klemm Aeromarine, spent two days on business here arriving on the twenty-eighth.

Pilot Lee Miles of Fort Worth dropped in in a Cessna C-37 on the thirtieth.

The Phillips Petroleum Company's Boeing 247-D of Bartlesville, Oklahoma, piloted by C. E. Clark, arrived in Brownsville carrying a party of prominent Oklahomans on May first. Several days were spent by members of the party in fishing at Port Isabel before returning to Bartlesville.

Pilot Walter Fullwood of McAllen paid us a visit in his Aeronca on May second. Walter is an old timer in the private flying game and the writer's friendship with him dates back to the Good Old Days when we were both barnstormers; therefore, we are always glad to have him drop in on us. Pilot L. S. Turner, former Bowen Airlines pilot now flying the Illinois Oil Company's Beechcraft from Dallas was another old friend to drop in on us.

Pilot Dos Decelles passed through enroute to San Luis Potosi, Mexico, where he will deliver a new Spartan executive to General Cedillo of the Mexican Army.

Of unusual interest was the flight of six large Boeing Biplanes through here enroute to Teguicigalpa, Honduras, where they will be delivered to the Honduran Government for military use. The flight was in command of Col. W. C. Brooks, Aviation Advisor to the Honduran Government. Pilots in the group included Paul Walker, Gus Michelson, Chas. Wellestead, O. Kenwood, and R. Bates.

An unusually large shipment of air express was cleared through this port on the fourth. The shipment consisted of one thousand pounds of machinery parts for a large excavator. The shipment was from the Harmschseger Co. of Milwaukee, Wis., to the Anahuac Machinery Co., of Mexico City. The shipment was handled by American Airlines to Dallas and from Dallas it was flown to Brownsville in a special Lockheed Vega of Braniff Airways. From here it was handled to destination by the regular plane of Pan American Airways. The shipment left Milwaukee on the morning of the fourth and was delivered to consignee at noon of the fifth.

Cincinnati, Ohio

By Al F. Davis

Here's news. There's a new college giving out a new degree in Ohio. The degree is that of C. J. and it means "Chute Jumper." The college planned to hold graduation exercises at Lunken Field, but Al Wunder, Airport Manager, promised to extend a hearty welcome to all fifteen would-be jumpers by "pinching" each one as their chute brought him to the ground.

So the lads and lassies journeyed out to Mr. Healthy Airport where some of the older jumpers did "bail out" and get their diplomas. However, Capt. Charles "No Jump" Coddington said no jumper under 21 years could ride the airwaves at Mr. Healthy Airport. Oh, yes, the youngest would-be leaper was Dot Jean McCourt, age 14 years. Now, Dorothy, fun is fun—but after all, at your age. Any way, where there's a will, there's a way, so some of the boys and girls made the leap. The chief trouble was that they had only one chute and this had to be repacked after each jump.

Say, "Professor" Glenzok, the next time you have "graduation exercises," bring along an extra chute. Maybe "ye olde scribe" might take a look—see over the side.

And while we're on the subject of parachute jumping, it reminds us that Earl Stein, ace "bat wing" artist, is scheduled to jump at the Sharonville Airport the second Sunday in May. He is here with the Linco Flying Aces, headed by that all-star aerial ace, Lt. Joe Mackey, who is tops when it comes to flying. According to the latest reports, Joe will be in there pitching at the International Aerobatic Competition held at St. Louis, May 29, 30 and 31.

Joe took the Freddie Lund trophy at the All-American Air Races at Miami and he is due for more honors this year.

Another classy flyer was in town recently, Capt. Alex Papana of the Roumanian army. Capt. Papana stopped at Lunken Airport on his way from Miami to Dayton, Ohio. He is one of the entries in the Trans-Oceanic Sweepstakes to Paris, France. Prizes totaling $150,000 to the winners. If we could just remember where we put those five gallon cans, we would consider throwing them in the baggage compartment of an Aeronca and taking a shot at that $150,000.

And speaking of Aeroncas, they are now working night and day to meet the deluge of orders that continue to pour in for the new high wing model. The production schedule is being stepped up to three ships a day in addition to the production of the Aeronca low wing model.

East and West do meet at the Aeronca factory. George Edwards, Aeronca distributor for New York, flew in the same day that Joe Plosser, Aeronca distributor from California, arrived at the factory. Fred Height from the Dakotas was also in to take delivery on a new K Model Aeronca at the same time.

Coffeyville, Kansas

By Harold E. Haggard

As this is being written, the Inman Brothers are putting the finish touches to their Boeing 80-A preparatory to leaving for the summer season of barnstorming. The Ford has been completely reconditioned, and now the Tri-Motored Boeing, too, is practically together after having undergone a complete overhaul.

Coffeyville Airways Corporation plans to purchase a small light plane in the near future to train the forty or more prospective students who have signified their intention to learn to fly this spring and summer. As a result, several light planes have been demonstrated here during the past month, among which were a Taylor Cub, brought over from Wichita by Dick Hayes and Mr. Johnson; an Aeronca from Chanute, flown by the Chanute airport manager, O. E. Dickerhoof, and a Porterfield from Kansas City, flown by Edgar Smith.

Nolan Junge, Lee Ferguson, and Henry Duncan attended the Fordon-Brown airshow in Tulsa. The trip was made in Duncan's Warner-Cessna.

Bob Liptack, Sand Springs, Oklahoma, electrical supply dealer, has flown his Continental powered Heath Parasol here and stored the tiny ship in the local hangar.

George Harte was in during the month in a new Stinson Reliant from Wichita. "Pop" Cantrell from Chanute dropped in for a couple days' visit recently. "Pop" was flying the Hisso Waco.

Dallas, Texas

By Sally Bryan

Carl Friedlander of Cincinnati, one of the motivating forces behind the Aeronautical Corporation of America, came to town recently and in a few hours had signed a contract with Booth-Henning who have taken on the North Texas distributorship of Aeronca. Carl reports his factory is putting out the smoke and maintaining a production of

The NEW AERONCA!

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Aeronautical Corporation of America

Lunken Airport - - Cincinnati, Ohio

three a day in order to keep up with orders on the new High Wing Model K as well as the low wing job.

Dallas is looking forward to the visit of Oklahoma's annual air tour in June. We are planning on giving the visitors the best time of their itinerary.

A committee has been selected to make arrangements for a dinner-dance to be held the night of June 9th for the Oklahoma Air Tour when it stops overnight in Dallas. Mrs. Joe Towle is chairman of the committee and she will be assisted by Mrs. Bub Merrill, Mrs. Claude Seaton, Mrs. Cliff Pettit, Mrs. Andy Anderson, Gerry Honomichl, Mrs. Christy Bryan, Mrs. C. W. Roderick and Mrs. H. W. Scott. The blow-out will be held at the Melrose Hotel, selected as official Air Tour Headquarters.

The W. N. A. A. unit of Dallas had a call meeting May 6 at the home of Mrs. Cliff Pettit, for the purpose of discussing plans and appointing delegates for the national convention scheduled for Tulsa May 14. The delegates appointed were Mesdames Pettit, Ben Bransom, Katherine Henning, Stella Tryon and Andy Anderson. Miss Gerry Honomichl, president of the unit, Mrs. Joe Towle, Mrs. Jean Foote and Miss Louise Zarr plan to attend. Mrs. Foote is one of the sixteen honorary members of the national organization and plans to fly her own ship to Tulsa for the convention.

Business of recent weeks has been better than ever before, what with a lot of new and used airplane sales and with the overhaul departments of Bennett Aircraft and Booth-Henning running near to capacity. Lou Foote sold and delivered three new "Cubs" the first of May. They went to Wilbur Parrish, Temple, G. L. Rutherford, Greenville, and J. R. Armstrong, Lubbock. Clent Breedlove of Lubbock made the latter sale. Foote also reports a lot of student training going on at his hangar. Orville Brokaw received his Amateur and Randall Wilson took his Private on the same day. The J-5 Travelair has just been recovered by C. W. Blackwell of Palestine and it's a mighty slick looking job. The fuselage is painted Stinson Beige with International Orange wings and tail.

A welcome visitor at the port recently was Jim Allison, who has just returned from a business trip to Spain. While in Paris, Jim rested up and cured a sore knee prior to his trip home. He expects to return to Spain shortly and will pursue his piloting job with the "Reds."

We have recently seen an interesting charter of a new organization to be known as the "D. P. Pst. Amusements, Inc." A Delaware corporation, which states "We, the undersigned, herewith and hereby agree, whereas Paul Blackwell and Doc Booth have superior intelligence and initiative. We, the undersigned do hereby agree and do post the sum of eight dollars American to cover investment in chattel previously agreed upon to the above P. B. and D. B. Signed in the presence of the most highly intelligent individuals in North Texas, who testify that intelligence is the greatest gift from Heaven. Witness: C. A. Rowe, Frank Say, R. V. Cowden, Cliff Pettit, R. E. Cowden, Hoka-Hoka, and Alex Hudson." Purpose of the organization is to entertain visiting airmen during the forthcoming Pan American Exposition in Dallas.

Grand Prairie Airport had a gasoline engine model contest recently with about 500 people in attendance. On May 30 they are planning to have an air show. Complete announcement of events will be made later. The Grand Prairie port is now under the managership of Miss Estelle DeYoung and Leo Jackson.

Enid, Oklahoma

The Enid Flying Club met in regular session recently at the home of secretary Loretta Leonard, hostess to president Roy Morgan, treasurer Russell Harbaught, instructor Harold Kindred, members Wally Abbot and Francis Keen, and new member Roy Holbird.

Student pilot, mechanic, member—Francis Keen—was employed to apply the gallon of dope (under the supervision of instructor Harold Kindred) provided by the Taylor company, to the upper wing surfaces of the club's "Cub." Kindred reports a recent hundred hour check of the "Cub" disclosed everything in perfect order, this being the second such check of the ship's motor.

With the mild April and May breezes prevailing, with still, clear mornings and delightful late afternoons for flying, this club's membership is expected to add considerably to their total flying hours during the month.

Greensboro, North Carolina

By William L. Beerman

Rededication plans for the Greensboro-High Point airport have progressed rapidly and are near completion. State and local police have confered in regard to the traffic situation, as a tremendous crowd is

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expected. The ceremonies and events will begin Friday, May 28, and last through Saturday, the 29th.

A large number of aviation celebrities have accepted invitations to attend, including Frank Hawks and Dick Merrill. As this is written Merrill is winging his way back to America from London and the Coronation. Miss Jessie Martin, aerial acrobat and stunt flier, and pilot Jimmie Woods will take part in the airshow. They are from Wichita, Kansas, as is P. H. Cunningham, who has been secured as an announcer.

Lieutenant Crawford H. Hollidge and Sergeant Angelo Cangiamila flew in the other day and were high in their praise of the new field. Flying a Douglas observation ship, they made the trip from Boston in four hours and 45 minutes, stopping only at Baltimore.

Henry W. Rafus, former manager of the airport, has been given a five year contract to continue in the same capacity. A Cub has been purchased and it is understood that a flying school will be started. A low cost solo course will do much to promote private flying in this section.

All planes have been removed from the field in order to begin work on the hangar, consequently there is very little flying at the present. Sunday still sees a goodly crowd though.

Jack Mills now has a Curtis Robin, OX powered. Archibald P. Wilson has soloed it a time or two, once getting the scare of his life when the motor sputtered on the takeoff. Then Jack blew a tire out while taxi-ing.

Airmail and passenger service will be resumed by Eastern Airlines on May 17. There will be four ships daily, two northbound and two southbound. Advertising matter put out by the airline company shows Greensboro as an important stop, in fact the only stop in North Carolina besides Charlotte. Assistant Postmaster Joseph H. Armfield stated that stamp collectors have sent in many letters to go out on the first flight.

An aviation ball will be held at Sedgefield Club in connection with the dedication program. A New York orchestra has been engaged for the dance, and the boys all plan to have a very, very good time. We know what that means.

Eastern Airlines has set up an office in a local hotel, with Robert L. Turner in charge. It is understood that express flights from New York to Houston and Houston to New York will not make stops here.

The dedication will be over with when the next issue of Southern Flight is out, so there will be plenty of interesting information from this port then. That's all this time.

Houston Main Street Airport

By E. B. Cassady

The Houston Main Street Airport was recently granted a corporation charter under the laws of Texas. Officers of the corporation are J. L. Schroeder, president, E. B. Cassady, vice-president and J. W. Spencer, secretary-treasurer. The new corporation will operate the airport and flying services.

Many people have been requesting information about flying instructions around here lately and the bug has become a part of some of them. New students include C. D. Varner of Humble, Frank Strouhal of Hungerford (Frank bought a "Cub"), Mr. R. F. Kreiter, Kreiter Gear Co., Houston, W. R. Holland, James McFerrin, J. E. Green, Miss M. Lea Barrett, J. W. Johnson, Major Nimmons, Robert Lester, C. A. Ramsey and W. K. Brooks.

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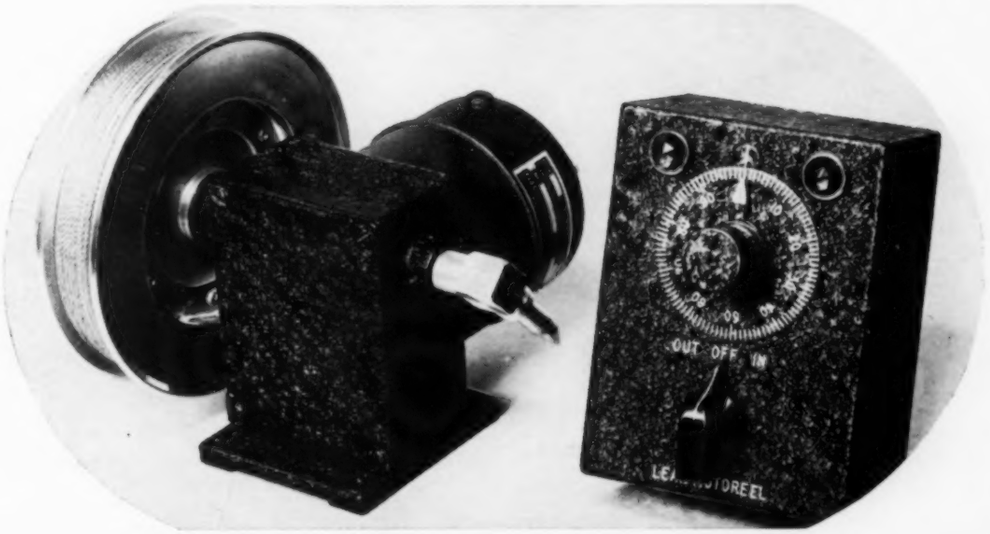

Pilots and owners who demand flight security realize the necessity of multiple frequency transmission. With the MOTOREEL they can vary the length of the antenna to get maximum radiation—without waste, with lower battery drain and with less operating costs.

Pre-select any given length of antenna, turn the "operate" switch to the "out" position, and the MOTOREEL will automatically reel out the length of antenna selected and stop. Warning lights remain on until the antenna has been retracted. Complete retraction is obtained by simply turning the control handle on the remote unit to the "in" position.

MOTOREEL complete weighs less than 10 pounds!

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LEAR DEVELOPMENTS, INC.

121 WEST 17th STREET **NEW YORK CITY**

Maynard-Di Cesare Propeller

This unique propeller was invented and designed by Pierino Di Cesare, air corps lieutenant and war-time pilot. It was first introduced to the aircraft industry last January during the National Aviation Show in New York City. The blades carry a decided arc and are offset at the hub.

Two types are available, the automatic type consisting of six internal parts and operating on a principle of exerted centrifugal force as governed by air pressure. The adjustable pitch type features a reduction in the mechanical operations of changing propeller ratios. Both types have been assigned Approved Type Certificates.

Adolph Pfeffer, "The Gentleman Planter," recently purchased the Stinson formerly owned by A. B. Alkek of Victoria and has been doing considerable fanning around lately. Bill Laming has moved his "Cub" to Humble and has one of the smallest airports in the world, so we believe. He is unable to get in or out of his field without at least a fifteen mile wind. Mr. Bill Long and Carl Dodge have moved in to hangar with us as has Cliff Hyde and Jim Champion with the "Jeep." Mr. Warren B. Leavitt also brought his new Porterfield in and the hangar crew is really kept busy getting these ships in and out when the days are pretty. We now have eighteen ships on the field.

Captain M. F. Clark of the D. O. C. put in a full day with us recently. Cliff Hyde, Jim Champion, Billy Nichols and W. Soule Dunn, Jr., were granted private licenses and besides licensing two planes the Captain had a few minutes for lunch. Plenty of ground flying going on around here now.

Mr. J. L. Schroeder has just returned from Florida. We are still watching and waiting for him to pull out an orange or grapefruit as a souvenir. Pilots L. B. Day, E. B. Gaither and W. B. (Red) Morris also report good fishing and plenty of fruit in that balmy climate of Florida. Red has proof of his piscatorial ability: snapshots of the "Real McCoy."

Recent solos among the boys: Bob Lester, B. J. Philibert, Major Nimmons, J. W. Johnson, J. E. Green and Frank Strouhal.

Houston Municipal Airport

By Clyde Foreman

The Superior Oil Co. has received their new Lockheed "12" and it will base at this airport. Calvin Williams, the co-pilot and mechanic, is busier than a one armed paper hanger and the ship is really spic and span.

Gene Meador, Packard distributor for South Texas, has placed his order for a new Waco job. It will have four parachute seats and most of the instruments for blind and night flying, including two-way radio. Gene does his own flying and covers the state often. He considers an airplane a very necessary means of transportation.

Reg Robbins has been here the past few days in his new Howard and it is certainly one performing airplane. However, we believe Reg could get performance out of anything with wings on it.

Air Activities, Inc., sold two ships during the first week in May, one in San Antonio and one in Houston; however, they still have a large stock of used planes at most any price.

The airport situation has progressed further since the last writing. The Mayor and city commissioners have finally agreed on the site and price to be paid after several of the airlines expressed their desire to increase facilities and add more runs into Houston when the issue is settled. The present site will be increased to over 600 acres. We also understand that the Government plans to spend around two or three hundred thousand dollars on new hangars, drill room and barracks.

J. M. Ferguson, Jr., "the flying ghost," has finally bought his own ship. He cracked up two ships learning to fly, but was not discouraged and is coming along nicely now.

A. O. McQueen of Lufkin, Texas, made the trip from Allance, Ohio, to Lufkin in twenty-three hours in his new Taylorcraft. He expressed much satisfaction on the performance of his new ship and believes it will be very popular with his students.

Miami, Florida

By Karl Voelter

Accompanied by Pilot L. A. "Rusty" Heard, Bill Swisher flew his newly acquired all metal Stinson low wing to Havana lately and judging from the reports they did the town. The gleaming silver ship enroute over the City of Havana to the airport attracted considerable attention and by the time they reached the airport the roads were crowded with soldiers and civilians attempting to see what might be happening. It was suggested to them by the writer that they paint a couple of broom handles black and point them through the windows as they cross the city, just to "fool" them, but we are afraid neither they nor the ship would have come back under those circumstances.

Private plane travel between Miami and Havana is becoming very frequent since the running of the Miami-Havana Air Race last winter. Just a few weeks ago Pilot Joe Marrs of the Voelter staff flew an Aeronca to Havana and back on a pleasure jaunt. Evidently Marrs and the owner of the ship—W. H. Selby of Fort Wayne, Indiana, got the right sort of liquor over there for they suddenly noticed from the "smoke" (and other things) that they had a beautiful tail wind back to America if they could get started—so with Customs officials trailing them they rushed to the airport, and got the ship out, and suddenly discovered the wind was exactly opposite to tail and the result was that they looked at the broad Atlantic for an hour and fifty minutes on the jaunt back to Key West, but Joe says "it was worth a million." Well, he knows, I guess.

Quite a sensation was stirred up on the arrival of the first of the new Aeroncas in Miami. State Distributor Voelter says, "I can sell 'em, but I can't get 'em," and that's truly the fact. The first ship, on order for about 10 weeks, was purchased long before receipt of it, by Drs. Martin and Pankey of Miami who are now the proud "papas" of Aeronca number 13. It's a honey and now the other purchasers are trying to find ways and means to get rid of each other so theirs will be next.

Howard Hughes who among other things owns one beautiful two place Douglas—full of gas tanks—is letting Voelter curry it in his hangar at Municipal Airport. After two months non-flying (so far as this ship is concerned) Howard and his mechanic decided to break it loose recently and after getting all hands on deck at six A. M. (with tractors pulling and men shoving) it stood on the line until about two and then the operation reversed, and old Doug is back in the stall. Howard likes to come to Miami though—and this is a swell excuse.

Good old "Doc" Green, known to all the old timers in and near this district, and who held forth at Jacksonville headquarters so many years, is truly ensconced in Miami. With the most elaborate aeronautical set up in aviation's medical department he is operating under the name of Eastern Air Lines Medical Division where he daily examines airline pilots to see "what is happening to them." Doc's tests are truly analytical and it takes each pilot practically a day to go "through" and after he gets out he knows he has really been examined, but, according to Doc Green it's proving a wonderful experiment, and the best part of it is he is finding that pilots are going to fly a lot longer than they ever thought they would, and that's good news for all of us, isn't it?

Annette Gipson is back from Broadway and Roosevelt Field where she just finished setting up her brother as manager of her hangar on Roosevelt Field. Annette has a home at each end of the line now, and though she hasn't a hangar at the Miami end she keeps her ship with the Voelter outfit and they are now getting it ready for the home jaunt and seasonal operations up North. According to Annette she's all set for big aviation business up there and will welcome all to her new establishment—and those who know Annette, knows she does 'em up right.

Bob Roberts—weather ship operator since its inception in Miami, has again been the lucky bidder locally and will continue to fly the weather. His pilot, Bill Bowerman, who has done the daily flying, has himself been a lucky bidder, but in far away Salt Lake City, and now Bob has to put another pilot in the saddle. We don't know who he'll be.

T. Carson Chalk, who has operated from Miami Municipal for a number of years, says he's going foreign on us maybe—looks like he's going to put pontoons on his Bird and hibernate to Nassau for some purpose. Maybe—perhaps he and Charlie Collar (over there for a couple of years now) have something cooked up. Charlie is personal pilot for the Governor of the Island, which should make him close to a Vice Admiral or something.

Oklahoma City, Oklahoma

Oklahoma's newest flying schools is now in operation on the Wiley Post airport. John Burke is owner and operator. Two veteran instructors, Syd Maxfield and Cliff Giblet, will supervise student training. Wiley Post, Wacos and Cessnas will be used for primary and secondary instruction. Burke states that a complete mechanics course will be included shortly.

We are all ready for the big celebration Sunday, May 23rd, when a free air show will be held at the Municipal Airport with such stars as Al Williams and Jimmy Doolittle present. Known as the Wiley Post Memorial Air Show, we plan to have one of the largest gatherings at the field the city has ever known. An aviation dance and banquet will be held on Saturday night preceding the air show. Moss Patterson is in charge.

The largest mass flight of Army planes ever to visit the city will land on May 18. There will be eighty ships in the group from Kelly Field, under the command of Major Knapp. The flight is for the purpose of interesting young men in the U. S. Air Corps and a 15 minute formation flight will be staged over Oklahoma University in Norman. Pursuit, Observation, Attack and Bombing planes will be included in the group. One of the Boeing "Flying Fortresses" 299 Bombers is reported to be making the trip.

Pittsburg, Kansas

By Juanita Horn

Bill Dugan of Little Rock, Arkansas, flew his Stearman in and expects to stay a week making minor repairs on his plane. Bill says Little Rock, a town of about 100,000, has a splendid field and cement runway but no hangar for the nine planes there. All have to be tied down.

Thelma McCaffrey and Cecil Jenkins soloed a week ago. They handled the plane like veterans.

Max Dail, Don Strait and Art Coombs started taking lessons recently. Art Coombs, Dave and Charles Wilson are nearly ready to solo.

Don Blasor is wondering why his name doesn't appear in the news. Well, here his name is.

The airport attendants have been working on a road leading from Twentieth street in town to the airport corner and now have it passable making a cut of two miles.

Lieutenants Warren Parr and J. G. Shaffer and First Class Seamen F. W. Davenport and J. L. Callis of Los Angeles, Calif., made a stop here recently.

Glenn McConnell of Parsons recently flew in his new Taylor Cub to hangar it here. Incidentally Glenn is the Cub Dealer for Kansas now.

San Antonio, Texas

By Greg Moore

The big event of the month was a sunrise breakfast sponsored by the very active local chapter of the N. A. A. Sunday morning, May 2nd, at 6:30, the first ship left this field headed for San Marcos, where Mrs. Fred Harman, wife of the field manager, waited with a swell breakfast which she served to some sixty-five people. All the local hangars were represented, and three ships came over from Austin. After breakfast the party returned to Stinson Field, and the last ship landed at eleven, which made a fine cross-country trip. The weather was just what the doctor ordered and everyone agreed that it was a most enjoyable morning. United Aero was represented by Don Mitchell and Vordenbaum, Mr. and Mrs. Abe San Miguel, Geo. Fling and Gabriel French, Al Tuerpe and Mike Guerra flew the Aeroncas. Marlin Fischer and Stewart Harris were left afoot when their "ride" to the party found that he had to work, so they did a little thumbing around the field and were given a lift by Lamar Seligson in his Waco. Something new in hitch hiking. Lee Miles, of Fort Worth, who has been visiting here, went over in his Cessna. From Hangar Six went Col. and Mrs. Lapham in the Colonel's Stinson, Leland Long and three guests in the Waco, Bill Beck and wife flew the Rearwin, and the following flew Taylor Cubs: Bebe Kelly, Stanley Hall, and Paul Leberto. Sam Dunlap took a couple of people with him in his Stinson and after breakfast continued on to Dallas. Dick Hair went over in his Travelair and Eng Lee flew his Fleet. "Doc" Decelles, who is waiting to deliver a Cabin Spartan to Mexico, joined the party. From Austin came G. C. Cross in his Robin, and Luther Thomas in his Porterfield. He had as a passenger Mrs. Harry Hammill, wife of the Austin Airport manager.

United Aero reports two new students: Stewart Harris and Thos. Gahan. A. G. Holloway has sold his Stinson and is waiting delivery of a new 1937 Model K Aeronca.

Hal Henning flew down from Dallas the other day to pick up Mrs. Osa Johnson, who has been giving lectures on Africa.

Blanche Noyes has been here supervising the marking of airways for the Department of Commerce. This is a good piece of work, and she deserves plenty of credit.

Hangar Six has ordered a second carload of Taylor Cubs, but as yet have not received them due to the rush at the factory. Col. Lapham has been made special Assistant to the President of the N. A. A., which is some honor and Hangar Six is justly proud of its President. Leland Long and P. H. Hebert made a cross-country trip to Bandera in an attempt to find a good practice field for cross-country instruction. E. M. Harris, a local mechanic, purchased a Taylor Cub.

Savannah, Georgia

By Lydia Muse

Major A. B. McMullen, new airport Chief of Department of Commerce, flew into Savannah and inspected the Municipal Airport and seemed quite pleased in the work on the new runways being done here.

After Mr. Walter Beech's visit here Strachan Skyways, Inc., might take on Beechcraft distribution for Georgia and Florida, Owen Mac-

Taylor Made
For Southern Skies

The New "CUB"

AT THE LOWEST PRICE IN HISTORY $1270.

Write for our used ship list or
stop in and see us personally

The South's Leading Airplane Dealers

BLEVINS AIRCRAFT CORP.
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Everything for the Airplane
Owner, Operator & Manufacturer
BEAZLEY
AIRPLANE COMPANY, INC.

Robert being the sales representative for the company.

Eddie Horton from Rearwin factory stopped in and demonstrated the new Rearwin to several sportsman pilots here.

Perry Solomon, Jr., soloed in Strachan Skyways' new Cub after three hours and fifteen minutes of instruction.

William Jenkins and family flew in here enroute to Sea Island from Atlanta.

A beautiful, new, completely recovered and majored Great Lakes Advanced Trainer has been added to Strachan Skyways School. This ship is equipped for night flying.

Roy Workman has received his private license.

Shreveport, Louisiana

By Jack E. Myers

BARKSDALE FIELD, THE WORLD'S LARGEST AIRPORT

This field held "open house" on Army Day for thousands of visitors in the Shreveport area. All available planes and equipment were placed on display for the inspection of civilians. In the afternoon, sixty pursuit and attack planes gave an aerial demonstration over the city, performing very difficult maneuvers. Lieut. Col. Earl L. Naiden, Third Attack Group commanded, led this flight, which was broadcast via short-wave over a local radio station.

It has been officially learned that Barksdale field is to receive 56 new type army attack planes beginning May 12th. These ships, added to the 78 already here, will bring the Attack Wing's airplane strength to a total of 134. These new type ships are low-wing Northrops.

Thirty-nine pursuit and attack planes of this field journeyed south, to the little city of Mansfield, Louisiana on April 8th, where they staged tactical maneuvers over the site of the Battle of Mansfield for the benefit of the convention there of the United Daughters of the Confederacy. Lt. Col. Naiden and Maj A. F. Herold commanded this flight.

The War department at Washington has ordered Maj. A. C. Strickland and Capt. Milo N. Clark transferred here from Randolph Field, San Antonio, Texas. This transfer will become effective June 15th.

Two Barksdale men, Edgar R. Camp and Troy Keith have received transport pilot licenses from the bureau of air commerce. This gives them the privilege of flying commercial planes carrying passengers or mail.

Fifteen Martin bombers visited this field as they winged their way back to March Field, their home port, after they had conducted maneuvers in New Orleans.

On May 3rd, 48 planes of the 55th Pursuit squadron, led by Maj. F. O. D. Hunter, roared off to the California coast to take part in intensive G. H. Q. air force war maneuvers. On the following day 55 more planes of the Third Attack group, under the command of Lieut. Col. Earl L. Naiden left to join the pursuits. The war drills are to be centered at Muroc Dry Lake, situated on the California desert. Approximately 250 planes are expected to take part in these maneuvers which will consist of planes from Langley Field, Virginia, and Selfridge Field, Michigan. Many of these ships stopped at this field on their journey westward; among them one of the "flying fortress" bombers, powered by four 1,000 h. p. engines. This plane will not take part in the maneuvers. The "war" started on Saturday, May 8th and will continue for three weeks.

MUNICIPAL AIRPORT

Max Fleischman, yeast magnate, was an air visitor here on April 14th. He flew here from Cincinnati in his private Lockheed twin-engined club plane with Harry Ash as his pilot. Another prominent air visitor was Mr. D. Howard Doane, president of the American Society of Farm Managers, St. Louis, who came here for a Chemurgic conference.

On April 8th, twenty-eight planes took off from the Municipal airport on Louisiana's first state air tour. In the course of their flight seven more were added from various airports, making a total of thirty-five ships when the air caravan ended its tour three days later in Monroe, Louisiana. Pilots from all points of the state participated in this flight which visited fourteen cities, principal stops being made at Mansfield, Patterson, New Orleans, Baton Rouge, Alexandria, and Monroe. At Patterson, the group paid tribute to the late speed pilot, Jimmy Wedell. Local flyers in the caravan were Van Lear Leary, Jimmy Wheeler, Conway Allen, F. W. Martin, Lake Littlejohn, Preston Jester, F. C. Nagle, Joe Messina, Stan Stelle, John Peyton, C. S. Stovall, T. R. Young, George Hearn, M. B. Cahn, and Dan Leahy. Gov. James V. Allred of Texas sent Miss Larnie Bowman of Dallas, a "flying Texanita" to accompany the group.

Tampa, Florida

By R. E. Burritt

The annual meeting and dance of Tampa Chapter, National Aeronautical Association, is scheduled May 15 at Davis Islands Country Club.

The meeting and dance will be informal and will be open to the public, it was said. Officers for the coming year will be installed. Sidney C. Brown was reelected president of the group at the recent election.

The committee in charge has arranged for a dance and floor show, which will include moving pictures of aviation activities in Tampa and St. Petersburg. Scenes will be shown of the 22nd anniversary of the first scheduled air line, breaking ground at Peter O. Knight Field, and presentation of the St. Petersburg N. A. A. Chapter with its charter.

Colonel and Mrs. Peter O. Knight, Mayor and Mrs. Chancey, Mr. and Mrs. L. G. Moore and Mr. and Mrs. Sidney C. Brown have been invited to be sponsors for the affair.

A number of out-of-town guests and aviation notables have been invited to attend the affair. These include Charles F. Horner, president of the N. A. A., Washington; Maj. Fred Smith, Washington; Wayne W. Parrish, editor of the National Aeronautic Magazine, Washington; Maj. A. B. McMullen, chief of the airport section of the Bureau of Air Commerce, Washington; C. T. Hansen, assistant director of aviation of the City of Miami; Capt. J. R. Puckett, Bureau of Air Commerce, inspector and N. A. A. governor for Florida, and others.

The occasion of this meeting is to acquaint the people of Tampa with the recent rapid development of aviation here which is especially due to the nearly completed Peter O. Knight Airport. The development of this outstanding aviation facility in Tampa's progress as a great aviation center has created a great deal of interest in all branches of aviation.

The Tampa Chapter was organized as the Tampa Aero Club in 1929. Last year it became affiliated with the National Aeronautic Association. The Tampa Chapter was the fourth largest N. A. A. chapter in the United States in 1936 and now has a membership of more than 100.

Tulsa, Oklahoma

By Frances Brown

Several new members were welcomed into the Tulsa Unit of the Women's National Aeronautical Association at its monthly meeting on April 14th, at the Gardner Tea Room. They were Mrs. Gerald Westby, 3301 South Zunis; Mrs. Chriss Morgan, 2733 E. Admiral Place; Miss Kathryn Malcom; Mrs. V. W. Post, 6930 E. Connecticut; Miss Orlena Neighbarger, 802 N. Boston; Mrs. H. C. Duncan, 7049 E. Zion; Mrs. Jack Huff, 12th and S. St. Louis Ave.

As is true of the organization as a whole, the interest of these new members in aeronautics has a wide range, varying from the holding of a pilot's license to a business connection in the industry, to a general enthusiasm for flying.

Mrs. Morgan is a graduate of the Spartan School of Aeronautics and holds a private pilot's rating. She started her flying in 1933 and has over one hundred hours of solo time. At the Tulsa Air Meet at Commercial Airport last fall, she won the spot landing contest and received a trophy awarded by the Tulsa Women's Auxiliary. The daughter of Mr. and Mrs. W. C. Tucker of Pawhuska, Mrs. Morgan came to Tulsa last December and was married in an aerial ceremony. Mr. Morgan is ground school and flight instructor at Spartan School.

Miss Kathryn Malcom is District Traffic Manager of Hanford Airlines, Inc., whose office is in the Philtower Building. She has been associated with airline traffic work for the past five years, and is a member of the Chamber of Commerce Aviation Committee.

Mrs. Gerald Westby, well known in Tulsa social and civic clubs, became interested in aviation through her husband, who is a sportsman pilot and the owner of a new three-place cabin monoplane. Mr. Westby, president of the Seismograph Corporation, uses the airplane for business transportation as well as for his personal hobby.

Mrs. V. W. Post finds that the weather plays an important part in her daily life, as her husband is radio operator for the Department of Commerce, and is stationed at the Municipal Airport.

Mrs. H. C. Duncan's chief interest is in the airlines inasmuch as her husband is city sales manager for American Airlines, Inc., whose ticket office is at the Tulsa Hotel.

Miss Neighbarger, who is employed at National Supply Company, has developed an enthusiasm for flying as a sport through several of her friends who are pilots and otherwise connected with aviation.

Mrs. Jack Huff is the wife of a transport pilot who has been actively engaged in flying in the Southwest for many years. He is company pilot for the Seismograph Corporation. Mrs. Huff is also a member of the women's auxiliary to the Tulsa Airmen's club.

Plans for the National Convention of the W. N. A. A., to be in Tulsa May 14 and 15th, were generally discussed, and the program will be announced in detail by Mrs. Gordon Wright, president, early in May. At that time the new members will also be assigned to duties on the various convention committees.

West Palm Beach, Florida

By Art Keil

Completion of the first hangar unit at Morrison Field, West Palm Beach, and plans for further improvement of services offered visiting pilots has been announced here by James L. Turnage, airport manager.

The hangar was built by the Palm Beach Aero Corporation at a cost of more than $20,000 and will be operated by that firm. The building is 116 x 96 feet of reinforced concrete block and includes waiting rooms, offices and stock room. A small apartment for the use of visiting pilots who may wish to sleep at the field has been provided in connection with the apartment to be occupied by the manager of the service.

The company is operating charter service during the summer months after a successful winter shuttle line service between West Palm Beach and Miami. Student training will be offered under direction of Manager Wright Vermilya. Equipment includes two Taylor Cubs, a Waco and Fleet Trainer.

Palm Beach Seaplane Service at Roosevelt Base on the west shore of Lake Worth has just accepted delivery of a Bellanca seaplane powered with 450 h. p. Wasp motor for use in charter service along the coast and to the Bahama Islands where Marlin fishing has created considerable demand. The plane carries five passengers. One of its first trips with Leon Brink as pilot was a charter to Bimini for Woolworth Donahue and party.

Wichita, Kansas

By Creighton Merrell

One outstanding item for the past month is that of the old devil wind. Day after day local fliers combatted winds varying from stiff fifteen mile breezes to roaring gales which ranged from twenty-five to thirty-five miles per hour. On Sunday, lush day for fixed base operators, the wind was of gale velocities on all but one day of the month.

However, in the face of continued adversity, Cub and Aeronca pilots shoved skyward and before the month was out became proficient at flying in winds practically as great as the landing speed of their respective crafts. All pilots are hoping for a sunny and calm Maytime in which they can retrieve their pleasant disposition and pick up some extra cash.

Announcement has just been made by the U. S. Weather Bureau that Ben F. Bitler, licensed pilot and foreman of the wing department for Cessna Aircraft Company, has been awarded the contract for flying air mass soundings from the station at Oklahoma City. The contract is awarded for one year beginning July 1. At the present time the flights are being made by Carl Winstead, former well known Wichita pilot who operates a Cessna C-34 and makes each trip for $22.85.

Bitler learned to fly in 1927 and was licensed the following year at the age of sixteen. He is now twenty-five years old and has had several years of commercial flying. He has held his present position with Cessna for two years and is undecided at present whether he will personally fly the weather or sub-let the operation to someone else.

The **BARLING BOMBER - -**

was a big airplane, but it wasn't very practical. So very few Barling Bombers are seen about the airport.

The **TAYLOR "CUB"**

is a little airplane and it is extremely practical. So Taylor Cubs are seen at all the airports. We'll glady prove just how practical the new Cub is. Drop us a card or letter and we'll arrange a visit.

HANGAR SIX, INCORPORATED

STINSON FIELD **SAN ANTONIO, TEXAS**

"BETTER AIRPLANES FOR LESS"

WACO: 225 Jacobs, 3 place open. Dual controls. Complete set of blind flying instruments. Westport Radio, Navigation Lights. Special rear cockpit enclosure, front cockpit cover. Fuselage painted red with silver wings. Total time 530 hours. Airplane has been completely gone over. License expires February, 1938. All control cables new. Motor has no time since major. Cactus proof inner-tubes. Motor equipped with Scintilla Magnetos. Snap-on wind shield for front cockpit. Price $2,650.00.

WACO 1935: Standard Model WKCS. Jacobs 225 h.p. Total time on airplane and motor 325 hours. 21 hours since motor had top overhaul. Instruments, Bank and Turn. Rate of Climb. Air Speed, Compass. Clock and all regular engine instruments. 70 gallon gas tanks. Leather upholstery. Air Brakes. RCA two-band Radio Receiver. Paint, Fuselage Red, Wings Silver. Black trimmed with Gold stripe. Price $3,450.00.

FAIRCHILD: Model 24-C8-C. Warner Super Scarab Engine 145 h.p. motor. Three place cabin. Generator, Radio, Bank and Turn, Rate of Climb, Air Speed. Paint, Black trimmed with Red. Dual controls, wheel pants, instruments and navigation lights. Total time 750 hours, less 50 hours since major overhaul. Fabric and paint good. License expires February, 1938. A steal — $2,495.00.

LOCKHEAD VEGA: Model 5C, Motor Pratt & Whitney, Wasp C. 420 h.p. Gross load 4750 pounds. Color, lemon yellow with black trim. New upholstery. 70 hours on ship since new half shell installed, and front ring. All fittings on ship reinforced. 1100 x 12 oversize semi-air wheels. Rate of Climb. Turn and Bank. Altimeter Standard and Kollsman Sensitive Type Altimeter. 144 gallon gas tanks. Radio Receiver. Sperry Directional Gyro. Flares, Landing Lights. Motor driven Generator. Total time since major overhaul on motor 183.30. Total time on ship since overhaul, 7030.55. Ship repainted 20 hours back. All new type parts are in motor. What is your offer?

STINSON: 1936 Reliant, Model SR8-BS. Night flying equipment, many extra instruments, blind flying equipment, two band RCA radio, 80 gallon gas tanks, total time under 300 hours. Brand new October, 1936. Color: Stinson red, black contrast with gold stripe. Make me an offer.

AERONCA: Brand New 1936 Master C-3 model. Offered for quick sale: $1100.

AERONCA C-3: Motor majored and ship recovered. Priced for quick sale at $600.00.

TAYLOR CUB J-2: 1936, in perfect condition. Very little total time. $950.00.

TIME PAYMENT — 50% DOWN,
BALANCE 12 MONTHS

★

P. F. [Pop] HOTCHKISS MUNICIPAL AIRPORT FORT WORTH, TEXAS

The flight to 16,500 feet is made every day and the flight is made shortly after mid-night every morning.

The Wichita Municipal Airport was honored April 20 by a visit from Frank Holton, Houston, Texas, city commissioner, who was accompanied by Capt. Fred S. Wilbur, Houston Chronicle; Sam Johnston, Houston Post, and Paul Hochuli, Houston Press. The party came here to inspect our airport layout and equipment and evidently were well impressed. Holten remarked to Alfred MacDonald, airport director, that "Wichita has anything skinned we have seen yet. I'm not so sure but that all we need to do is to lift the Wichita plans and set them down in Houston."

The group came to Wichita on a tour of airports in the Southwest on which they hoped to gain ideas on how to properly spend the $500,000 recently appropriated by Houston for airport construction.

Mrs. Warren E. Blazier was elected president of the Woman's Aeronautical Association of Kansas at the April meeting held at the administration building of the Wichita Municipal Airport. She succeeds Mrs. Walter Beech, secretary of the Beech Aircraft Corp., who now becomes a member of the board of directors.

Other officers elected were: Mrs. W. H. Whipple, vice president; Mrs. Willard Bashaw, secretary; Mrs. Elizabeth Stewart, treasurer, and Mrs. Preston Kirk, Mrs. W. J. Patterson, Mrs. Harold Zipp, Mrs. W. R. Snook and Mrs. Harry Sutherland, members of the board of directors.

Under the guidance of Mrs. Beech the organization has filled an important place in Wichita. Through benefit carnival dances several articles of furniture and a large wall map were placed in the administration building of the airport. Socially the association has been a big help to bring closer relationships between the many persons engaged in aviation in Wichita.

On May 9th a Spring flying demonstration will be presented to aviation followers in and around Wichita. Reserve pilots of both Army and Navy stations from Kansas City will arrive here May 8th and attend a banquet and dance sponsored by the chamber of commerce and Womens' Aeronautical Association. On Sunday, the day following, various maneuvers and acrobatic performances will be presented to the vast throng which always turns out here.

The relative quiet of a Sunday afternoon recently was mightily disturbed when a squadron of six airplanes roared over the city making more noise than a fleet of Boeing bombers. When the group finally set down on Beech airport the squadron was found to be made of an assortment of Boeing mail and passenger planes of varying model and size. Leading the group was Col. William C. Brooks, formerly of Lincoln, Nebraska, and now director of the school of military aviation for the Honduran government. The planes were purchased from United Airlines as obsolete equipment and were being ferried to Honduras for use in the air service and for general transport.

In one of the airplanes Col. Brooks carried 10,000 lbs, of groceries for his wife; with him was his mother-in-law, Mrs. L. Moxon of Smith Center, Kansas.

Col. Brooks pointed out that the Honduras air force now consists of 350 men and nineteen airplanes. In addition to military service the planes are used for dusting cotton, scattering grass seed, and transportation to remote parts of the country. Col. Brooks operates the Beechcraft in which Louise Thaden and Blanche Noyes won the Bendix Trophy last fall. The plane was purchased by the Honduran government at the close of the race.

DON'T FORGET!

International Aerobatic Competition, Lambert-St. Louis Airport, May 29, 30, 31.

Seventh Annual National Air Carnival, Birmingham, Alabama, June 5, 6.

Oklahoma Tri-State Air Tour, Oklahoma City, June 9, 10, 11 and 12.

International Air Show, Chicago, June 12-20.

Georgia State Air Tour (second annual), Atlanta, June 17, 18, 19, 20.

Eighth Annual Soaring Contest, Elmira, N. Y., June 26-July 11.

National Air Races, Municipal Airport, Cleveland, Ohio, September 3, 4, 5, 6.

SAE National Aircraft Production Meeting, Ambassador Hotel, Los Angeles, October 7, 8, 9.

Errata

It was erroneously reported in the April issue that the D-17-R 450 h. p. Beechcraft cruises at 235 m. p. h. This model has a cruising speed of 202 m. p. h. The D-17-W 600 h. p. model cruises at 235 m. p. h.

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FOR SALE: The famous "Miss Streamline" of General Tire and Rubber Company with all equipment, less radio. This ship licensed for 4,750 lbs. gross, has 5 wing tanks, 15 gallon oil capacity. Motor 150 hours since majored. Ray W. Brown, Aeronautical Sales, General Tire & Rubber Company, Akron, Ohio.

TAYLOR CUBS: Used Cubs and New Cubs. Bargains. Free solo course given with purchase of New Cub. Lou Foote Flying Service, Love Field, Dallas, Texas.

LAMBERT MONOCOUPE, late 1936, 80 hours total time. A real show job, DeLuxe Equipment: turn and bank, rate of climb, Pioneer Clock, Thermocouple, Electric Starter and Generator, Grimes Retractable Landing Lights, Air Sales, Inc., 100 Ledger Bldg., Fort Worth, Texas.

FOR SALE OR TRADE: Hisso Eaglerock, licensed until August 1st. $450.00 cash, or will trade in on smaller ship. Lloyd Graham, 502 E. Ferguson, Tyler, Texas.

STINSON RELIANT: 1935. Turn and bank, rate of climb, sensitive altimeter, 320 hours total time. A real buy. Clean, never been cracked. Only $3400.00. ACT QUICK. Air Sales, Inc., 100 Ledger Bldg., Fort Worth, Texas.

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WACO 1934 Custom built, 225 Jacobs. Color: green. Lux fire extinguisher, head temperature gauge, Lear two-band radio, bank and turn, rate of climb, clock, landing lights and flares. Licensed til May, 1938. Total time on ship 1010 hours. Total time on engine since new: 260 hours. PRICE $2,737.

STINSON J-6-5, new cover, new upholstery, cowling ring, steel propeller, Heywood starter. A real buy: $775.00.
WASP C engine $350. WASP B $250.

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Wright J-5: New Factory J-5 steel exhaust guides $1.00. Carburetor and magneto parts, rods, pins, pistons, knuckle pins, all the cases.

Lycoming Parts: Late type master rod assembly and rods. Light type rods $2.00 each. Front rear and main case. Complete set of forged pistons. One shielded magneto, one carburetor.

Lambert Parts: Any parts furnished on request. Also many Kinner parts.

J-6-5 Parts: Nose section, rear section supercharger, valves, pistons, master rods, and many others.

Wasp Parts: Main case, cylinders, pistons, K. E. valves, etc.

REAL AIRPLANE BUYS

Waco DeLuxe, complete set of blind flying instruments. Night flying equipment, $600 worth of new parts being put in motor at this time.

Stinson Reliant. Only 370 hours total time. $1900. Metal Lockheed Vega, airline equipment, including transmitter and receiver.

These listings are all owned by this firm and purchasers do not have to pay any brokerage fees.

RITCHEY FLYING SERVICE - Meacham Field - FORT WORTH, TEXAS

Louisiana Tour

(Continued from Page 19)

club. Governor R. W. Leche sent his greetings and was presented with an honorary membership in the N. A. A. Dr. James Monroe Smith, president of L. S. U., spoke and Hon. Wade Bynum, mayor, presented the keys to the city although we didn't have time to use them. J. P. Fraim represented the university's department of Aeronautics. A quick trip through the university grounds, a dash to the airport and we left for the next scheduled stop, Alexandria. Here there were more speeches and a large welcoming crowd. Then in to Monroe, the last stop on the tour.

At the Bernstein country place, the Monroe chamber of commerce was host at a barbecue. The pilots were welcomed by C. E. Faulk, in behalf of Delta Air Corporation.

Following that a dance at the Frances hotel brought the first N. A. A. Louisiana air tour to a highly successful conclusion. No accident, bad weather, or mishaps marred the trip and everything clicked off like well-oiled machinery, which is a real feather in the Louisiana N. A. A.'s cap.

The ladybirds, as usual, made a big hit with the press photographers. There were Helen Johnson, Texas governor for the N. A. A.; Blanche Noyes, Bureau of Air Commerce; Mrs. Martie Bowman, Fannie Leonpacher, Augusta Walmsley, Gerry Honomichl (W. N. A. A. president, Dallas), Mrs. Fritz Martin, all of whom hold pilot's licenses. We've probably overlooked some of the others, but forgive us. After all, we had to read the morning paper to see who was in the flight with us the day before.

Among odd incidents in the trip we remember: Blanche Noyes (Bureau of Air Commerce airmarking department) noticing how many towns were marked "Jax" . . . Reg Robbins, giving the gals a thrill in his slick Howard . . . Joe "Little Sheriff" Messina's dramatic (?) entrance into the Lafayette floor show . . . Joe Shumate's candid camera . . . Robert Gill and Bernard Deris, who showed us the Vieux Carre . . . Everybody's good humor, not a grouch in the bunch.

As an aerial hitch-hiker we'd like to express our sincere thanks to Glynne Jones, "Buck" Rowe, R. Z. Glass, and Roy Harding before concluding with the list of pilots and their passengers which is guaranteed neither complete, inclusive or even accurate:

Mr. and Mrs. Cliff Giblet, Mr. and Mrs. Jim Clarke, Mrs. Almeta White, Leo J. Gros, R. L. Briant, J. Foreman, Jr., J. Heinen, Louis Lenz, Preston Jeter, W. P. Badgett, W. A. Caplis, Jr., Ken Elliot, Ed Apperson, San Stelle, Gordon Adger, C. S. Stovell, Bill Bagwell, Joe Messina, J. P. Fraim, Doug Langstaff, Roy Harding, Gerry Honomichl, Mr. and Mrs. E. E. Paxton, William Keefe, Edna Gardner, Geo. Stoltz, A. Monty, Blanche Noyes, S. E. Travis, Helen R. Johnson, Hal Henning, F. C. Nagle, M. B. Cahn, Mr. and Mrs. R. Z. Glass, Harry Sellers, Fanny Leonpacher, Mrs. Hazel Guilbeau, James Wells, Mr. and Mrs. Fritz Martin, Don Leahy.

H. C. Miller, F. Edney, Al Leach, Mr. Patton, Mr. and Mrs. Les Bowman and Lannie Bowman, E. R. Lambert, Ken Garrett, Chas. A. Rowe, Bill Grabill, Van Lear Leary, Deane Logan, Reg Robbins, H. S. Jones, Mr. Richardson, Mr. and Mrs. T. R. Young, Jimmy Wheeler, Charlie Hutchinson, Joe Shumate, Milton Smith, Henry Chapman, H. C. Epright, Earl Matthews.

The military touch was added by the presence of officers of the 154th Observation squadron, Arkansas National Guard: Capt. Phil E. Thomas, Lieut. Claude Holbert, Lieut. Charles M. Taylor, Lieut. Joel Y. Ledbetter.

New Equipment

(Continued from Page 17)

pit controls are the same as provided for a carbureted engine.

The injector unit contains seven reciprocating plungers, one for each engine cylinder. The discharge side of each plunger is connected to an automatic discharge nozzle at each engine intake pipe. Fuel is discharged in a fine spray into the intake pipe at a fuel pressure of approximately 70 lbs. per square inch. This discharge occurs only during the time interval that the engine intake valve is open.

The inlet holes to the seven plungers in the injector body lead to a common central passage where one needle valve controls the fuel flow. The position of this valve is controlled by cam mechanism inclosed in the body of the injector unit. The external connections are simple levers as follows: A shaft projecting from the injector unit carries a lever which is connected to a lever on the air throttle valve in the engine air intake. A separate manual control from the injector unit is provided for mixture compensation with altitude.

Just Among Ourselves

(Continued from Page 4)

that has recently come to our attention. The under-cover suggestion seems to have been spread about that a certain type of aeroplane widely used in this country embodies certain structural defects. The apparently wide circulation of this destructive rumor must at all costs be arrested, not only in fairness to the machine itself and its makers but for the good health of aviation as a whole which cannot fail to suffer when the safety of any aircraft is unfairly impugned.

"The type referred to is the Custom Waco which is giving such excellent and dependable service in operations throughout Canada. It is, we believe, a fact that a species of wing flutter did develop in certain Wacos of early 1935 vintage. This fault was soon recognized, however, and corrected by means of a modification. What makes the sub rosa circulation of this story so grossly unfair is the fact, which may be categorically stated, that no single Waco machine which could possibly be heir to the abovementioned failing has ever come into operation in Canada nor can ever come into such operation or use. Sponsors of the story must be well aware of this fact. Those who carelessly or maliciously pass it on may not be aware of it.

"Such tactics are unethical in the extreme, serving only, in the final analysis, to discredit their originators. There is enough aircraft business today for everyone without having to resort to means of this kind to get it."

Our Bounden Duty

AMERICAN Aviation is getting off to a late start in the program to perpetuate the memory of Wiley Post; however, we have just learned that the executive committee finally has decided upon the nature of the memorial, which will take the form of a handsome trophy to be presented annually for "the greatest contribution to sub-stratosphere or stratosphere heavier-than-air craft development or the most outstanding long distance flight, making use of the sub-stratosphere, made during the year."

Five thousand dollars is the amount to be raised. Your contribution will help a lot in the immediate dispatch of this important duty. Airfolk in the southwest especially should welcome this opportunity to have a part in the program. Subscriptions may be sent to Thomas A. Morgan, Treasurer, care of the National Aeronautic Association, Washington, D. C.

Measure the **VALUE** *to you of Parks Air College Training*

IF you measure the value of Parks training by the substantial worth of its curricula, then bear in mind that...

- Four courses are offered, each requiring 8 terms (96 weeks) for completion and each leading to the Bachelor of Science degree.
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- Each course provides specialized training preparing for entrance to and advancement in one of the major fields of aviation: Professional Flight, Aviation Operations, Aviation Mechanics or Aeronautical Engineering.
- The combining of practical and theoretical training and the high standards of performance required for graduation assure graduates of their ready acceptance by aviation's executives.

IF you measure the value of Parks training by the demand for Parks graduates, then bear in mind that...

- There is an active demand, in fact, a competitive demand, for all available graduates.
- Seventy-five per cent of graduates go into commercial air transport where qualification requirements are highest.
- Requests for graduates are now exceeding the number available by a wide margin.
- It has become customary to place entire classes prior to the date of graduation.
- Demand is equally urgent for graduates of each of the four major courses.

If you measure the value of Parks training by the opinions of the industry's most competent authorities, men who are disinterested except that they appreciate having in Parks Air College a source of adequately trained personnel, then consider what they say:

C. R. Smith, President of American Airlines, Inc., said:
"You are doing a fine job at Parks Air College."

H. D. Ingalls, Superintendent of Maintenance of American Airlines, Inc., said:
"I'm for Parks graduates. They know their stuff."

A. Francis Arcier, Chief Engineer, the Waco Aircraft Company, writing to President Parks, said:
"We would greatly like to fill our vacancy from the ranks of your graduates as we have a lively appreciation of the high standard to which your graduates must measure up."

Carl B. Squier, Vice President of Lockheed Aircraft Corporation said:
"Your graduates leave Parks fully prepared to fill their niche in the industry."

G. W. Vaughan, President of the Wright Aeronautical Corporation, said:
"You have a wonderful institution here."

Donald Frye, Personnel Director of Consolidated Aircraft Corporation, addressing the Parks Aero Club, said:
"We will have a job for any graduate of Parks Air College who comes to us with a letter of introduction from your President."

Jack Frye, President of Transcontinental and Western Air, wrote from Kansas City:
"We appreciate the good work you are doing over there."

Paul E. Richter, Vice President of Transcontinental and Western Air, in Charge of Operations, said:
"You can be sure that when we put on more men we will get in touch with you."

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